

## Final Stormwater Source Control Evaluation Work Plan

3950 NW Yeon Avenue  
Portland, Oregon

December 2015

Prepared for:  
Univar USA Inc.

[www.erm.com](http://www.erm.com)

Univar USA Inc.

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3950 NW Yeon Avenue  
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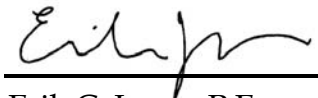
December 2015

Project No. 0274640



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## *LIST OF ACRONYMS*

AOC	Agreed Order on Consent
AOPC	Area of potential concern
BES	Bureau of Environmental Services
BMP	best management practice
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
COC	chemical of concern
COI	contaminant of interest
COP	City of Portland
cVOCs	chlorinated VOCs
DCA	1,1-dichloroethane
DCE	1,2-dichloroethene
delta-HCCH	Delta-Hexachlorocyclohexane
DOT	Department of Transportation
ERM	Environmental Resource Management
ESCI	Environmental Cleanup Site Information
IBC	intermediate bulk container
ICM	Interim Corrective Measures
JSCS	Joint Source Control Strategy
MC	methylene chloride
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
ncVOC	non-chlorinated VOCs
NPDES	National Pollutant Discharge Elimination System
ODEQ	Oregon Department of Environmental Quality
ODOT	Oregon Department of Transportation
OF 18	Outfall 18
PAH	polycyclic aromatic hydrocarbon

PCB	Polychlorinated biphenyls
PCE	tetrachloroethene
PES	PES Environmental, Inc.
PPV	Pacific Power Vac
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SCM	site conceptual model
SIC	Standard Industrial Classification
SLV	screening level value
SOP	Standard Operating Procedure
SPI	Stormwater Pathway Investigation
SPCC	Spill Prevention Control and Countermeasure
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compound
SWPCP	Stormwater Pollution Control Plan
SWSCE	Stormwater Source Control Evaluation
TCA	1,1,1-trichloroethane
TCE	trichloroethene
TPH	total petroleum hydrocarbon
TSS	total suspended solid
Univar	Univar USA Inc.
USEPA	U.S. Environmental Protection Agency
VC	vinyl chloride
VOC	volatile organic compound
µg/L	micrograms per liter
WTS	water treatment system

## 1.0

## INTRODUCTION

Environmental Resources Management (ERM) has prepared this *Stormwater Source Control Evaluation Work Plan* (SWSCE Work Plan) on behalf of Univar USA Inc. (Univar) to document the proposed plans and procedures for sampling catch basin solids and stormwater at the Univar property located at 3950 NW Yeon Avenue in Portland, Oregon (the “Property”) (Figure 1). This SWSCE Work Plan is being submitted in accordance with the Letter Agreement, dated 24 July 2015, between Univar and the Oregon Department of Environmental Quality (ODEQ) to investigate the stormwater pathway and implement any needed stormwater source control measures under ODEQ’s Voluntary Cleanup Program. This work is being conducted to evaluate whether actual or potential sources of constituents of concern pose an environmental risk to the Portland Harbor Superfund study area of the Willamette River via potential stormwater pathway or through groundwater in or along utility conveyance features that discharge to the Willamette River.

Univar began conducting stormwater pathway investigations at the Property pursuant to an Amendment to Administrative Order on Consent to Implement Corrective Action (Resource Conservation and Recovery Act [RCRA] Docket No. 1087-10-18-3008[h]) for the Property dated 1 August 2007 between Univar and the United States Environmental Protection Agency (USEPA). Univar submitted to USEPA a *Draft Stormwater Pathway Investigation Report* ([SPI Report] PES 2012) on 21 August 2012. ODEQ and the City of Portland (COP) Bureau of Environmental Services submitted comments to the USEPA related to the SPI Report on 5 December 2012 and 27 February 2013. Comments on the SPI Report have not yet been received from USEPA.

## 1.1

## OBJECTIVE OF SAMPLING

Stormwater runoff from rain falling on the Property has the potential to wash contaminants from the Property via stormwater piping that connects to COP-owned stormwater lines that eventually discharge to the Willamette River, nearly one-half mile from the Property. In order to evaluate and control potential adverse impacts to the Willamette River from industrial properties throughout Portland Harbor, the ODEQ and USEPA developed and jointly administer the Portland Harbor Joint Source Control Strategy ([JSCS], ODEQ 2005). The ODEQ is requiring individual upland property owners to identify, evaluate, and control

sources of contamination that may reach the Willamette River consistent with the JSCS. The JSCS is a guidance document that represents a framework that can be utilized to identify, prioritize, and implement source control measures at upland sites within the Portland Harbor Superfund Site.

The JSCS outlines the following process for performing stormwater source control evaluations:

- **Step 1 – Develop Background Information.** This information is used to provide the framework for selecting catch basin solids and stormwater monitoring parameters for the screening evaluation.
- **Step 2 – Select Sample Analyses Parameters.** This involves selecting parameters for monitoring catch basin solids and stormwater quality and locations for characterizing the stormwater pathways.
- **Step 3 – Design and Perform Catch Basin Solids Sampling.** Catch basin solids represent a time-integrated snapshot of potential solids discharged to the river. During this task, catch basins locations are selected, solids are sampled, and the samples are analyzed for the parameters selected in Step 2.
- **Step 4 – Design and Perform Stormwater Sampling.** Following catch basin solids sampling, stormwater grab sampling is performed which may include a combination of “first flush” grab sampling and composite sampling throughout the duration of a storm.
- **Step 5 – Perform Screening Evaluation.** Catch basin solids and stormwater sampling results are compared against JSCS Screening Level Values (SLVs). If site concentrations exceed SLVs, and readily-available best management practices (BMPs) are not effective at reducing concentrations below the SLVs, a qualitative or quantitative weight-of-evidence evaluation is performed to determine if more aggressive stormwater investigation and/or source control are needed.
- **Step 6 – Implement Interim Remedial Measures (if necessary).** If deemed necessary by the weight-of-evidence evaluation, remedial measures such as source removal, storm system improvements (e.g., line cleaning, catch basin replacement), or stormwater treatment may be implemented.

This SWSCE Work Plan is designed to address Steps 1, 2, 3, and 4 described above. Step 5 and Step 6 (if necessary) will be implemented, following the catch basin solids and stormwater sampling.

## 1.2

### *WORK PLAN ORGANIZATION*

This SWSCE Work Plan is organized into seven sections and six appendices as follows:

- Section 1 - Introduction
- Section 2 - Site Information
- Section 3 - Contaminants of Interest
- Section 4 - Sample Location Rationale
- Section 5 - Catch Basin Solids Sampling Methodology
- Section 6 - Stormwater Sampling Methodology
- Section 7 - Groundwater Infiltration Methodology
- Section 8 - Schedule
- Section 9 - References
- Appendix A - Historical Stormwater Sampling Results
- Appendix B - COP Drainage Basin 18 Figures
- Appendix C - Shallow Groundwater Isoconcentration Contour Maps
- Appendix D - Catch Basin Solid Sampling Standard Operating Procedures (SOPs)
- Appendix E - Stormwater Discharge Grab Sample Collection Standard Operating Procedures (SOPs)
- Appendix F - Quality Assurance Project Plan (QAPP)
- Appendix G - Project Schedule

## **2.0      *PROPERTY INFORMATION***

This section presents information about Univar's Portland Property related to environmental conditions, stormwater discharges, stormwater drainage, and stormwater pollution control measures at the Property. This information was previously presented in the *Draft Stormwater Pathway Investigation Report* (PES 2012).

### **2.1      *PROPERTY LOCATION AND BACKGROUND***

The Property is located at 3950 NW Yeon Avenue, Portland, Oregon. The Property is in a heavily industrialized area northwest of downtown Portland, approximately 0.5 miles south of the Willamette River and 0.25 miles north of the Tualatin Mountains (Figure 1). Univar is a wholesale distributor of bulk and pre-packaged chemical products. The Property is an active distribution facility and has operated as such since approximately 1947. The Property layout is shown on Figure 2 and has remained largely unchanged over the past approximately 30 years.

The Property is zoned "heavy industrial." Nearby properties include American Steel, McWhorter (also known as McCloskey Varnish), and the Shell (formerly Texaco) petroleum tank farm to the west; Container Recovery Inc. (formerly Convoy) and ABF/ASNR Trucking (formerly ANR) to the east and southeast; and Index Steel and Wilhelm Trucking to the south. The area has been industrialized for over 60 years.

### **2.2      *UNIVAR OPERATIONS***

The Property encompasses approximately 9.8 acres, of which 9.6 acres are impervious surfaces (Figure 2). All of Univar's industrial activities take place on paved or concrete surfaces. Major structural features include warehouses and office space, a railroad spur, loading docks, and aboveground storage tanks. A railroad spur runs along the west side of the warehouse and loading dock. A chain-link fence surrounds the Property with access via two security gates at the north end of the Property.

Univar currently receives, stores, blends, packages, repackages, and distributes the bulk chemicals listed in the table below. Transfers are made from rail cars and tanker trucks into tanks, drums, and intermediate bulk

containers (IBCs). Direct transfers are also made from rail cars to tanker trucks. Packaged chemical products are generally received along the west side of the Property and shipped from the east side of the Property, with the exception of small packages that are received and shipped from the northeast corner of the Property's covered drum storage area (Figure 3). Rail car unloading and product transfers, along with truck transfers, loading, and unloading activities, occur along the west side of the Property. Some industrial activities (covered drum storage, the drum packaging operations, blending, truck loading and unloading areas, chemical storage warehousing, and dry packaging area) occur within covered areas and are not exposed to precipitation or runoff. Bulk chemicals currently handled by Univar include the following:

Isopropyl Alcohol 99%	Lipotin 100
Mineral Spirits Low Aromatic	Caustic Soda 25%
Acetone	Aqua Ammonia
Toluene	Nitric Acid
Arcosolv PM (1-Methoxy-2-Propanol)	Sulfuric Acid
Vanzol A-1 190	Aluminum Sulfate
N Propyl Alcohol	Texanol
Woodlife	Propylene Glycol
Methanol	Caustic Potash 45%
Woodtreat MB RTU	Methylene Chloride
Solvent 2247	Trichloroethylene
Diethylene Glycol (DEG)	Versenex 80
Xylene	Caustic Soda 50%
Methyl Ethyl Ketone (MEK)	Hydrochloric Acid
Isopropyl Alcohol 85%	Glycol Ether EP
Triethylamine	N Butyl Acetate
VM&P Naphtha	N Propyl Acetate
Heptane	Liquid Wax
Glycol Ether EB	Ethylene Glycol
Sodium Bisulfite	Versene 100

The Property's structures are constructed of a variety of materials, including poured concrete or concrete block (e.g., office building, main warehouse), corrugated metal (e.g., maintenance shed, treatment system building), and wood (e.g., dry package storage warehouse, tank farm office). Many of the structures have one or more open sides to facilitate the handling and transport of materials throughout the Property. Roofing materials are constructed of felt tar paper over wood (e.g., office building, main warehouse) and corrugated metal (e.g., covered drum storage building, dry package storage warehouse, solvent packing shed).

### 2.2.1 *Hazardous Waste Management*

Univar is listed as a large quantity generator of hazardous waste. A variety of hazardous waste materials have been properly disposed of off-site based on a review of historical hazardous waste disposal records from 1992 through 2008.

## 2.3 *REGULATORY SUMMARY*

This section summarizes the Property's regulatory history and the results of environmental investigations conducted at the Property to identify potential sources of contamination, contaminants of interest, and potential pathways for contaminant migration to the Willamette River via the stormwater pathway, including:

- RCRA cleanup-related activities conducted under Section 3008(h) of RCRA consistent with the provisions of the Agreed Order on Consent (AOC) dated 15 June 1988 that Univar entered into with USEPA Region 10 (USEPA 1988);
- RCRA cleanup-related activities conducted under Section 3008(h) of RCRA consistent with the provisions of the Amendment to the AOC to Implement Corrective Action 1087-10-18-3008 (the "Amended Order") dated 1 August 2007 (USEPA 2007);
- Historical stormwater discharge monitoring in accordance with National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. 101613 (ODEQ 2004);
- Stormwater line inspections; and
- Soil sampling for East Drive re-paving.

### 2.3.1 *RCRA Cleanup Activities*

Univar reported four chemical releases at the Property between 1979 and 1985 that included trichloroethene (TCE), methylene chloride (MC), toluene, and mineral acid. In addition, several small releases of chemicals occurred at the Property during chemical handling and transfer activities.

In July 1986, USEPA issued a Unilateral Order to Van Waters and Rogers (Univar's predecessor in interest) to conduct an investigation of soil and groundwater at the Property in response to reported chemical releases. Van Waters & Rogers conducted this investigation in 1987 in two phases.

USEPA terminated the Unilateral Order in April 1988. On 15 June 1988, Van Waters & Rogers entered into an AOC with USEPA pursuant to Section 3008(h) of RCRA to address historical chemical releases at the Property. Sampling conducted as part of RCRA Closure activities detected the presence of volatile organic compounds (VOCs) in soil and groundwater. The Property was listed in the ODEQ Environmental Cleanup Site Information (ECSI) Database (Site ID#330) in 1988.

The provisions and requirements of the AOC, along with other relevant RCRA regulations and guidance, provided the basis for all subsequent environmental activities conducted at the Property, including investigation activities, the preparation of a RCRA Facility Investigation (RFI) report, interim corrective measures (ICMs), and the performance of the Corrective Measures Study ([CMS], PES 2006).

The initial field investigations were documented in the RFI report (HLA 1993). These investigations included installation of soil borings and groundwater monitoring wells. Constituents detected in soil included: tetrachloroethene (PCE), TCE, 1,1,2-trichloroethane (TCA), 1,2-dichloroethene (DCE), vinyl chloride (VC), and MC. Constituents detected in groundwater included benzene, toluene, ethyl benzene, xylene, PCE, TCE, DCE, TCA, VC, and MC.

Since then, Univar has performed supplementary site characterizations, ICM design and implementation work, deep aquifer evaluations, a regional groundwater survey, and completed the CMS report as required by the 1988 AOC. After Univar's completion of the requirements of the original AOC, and in particular the preparation and approval of the CMS report, USEPA prepared a Statement of Basis (USEPA 2006) describing the proposed corrective measure it had selected for implementation and issued the Amended Order. The Amended Order provided the basis for performing the Corrective Measures Investigation (CMI), which also included the SPI Work Plan and Draft SPI Report (PES 2010a, 2012).

In the CMS report and Statement of Basis, 20 chemicals of concern (COCs) were identified in soil and groundwater based on human health risk exposure pathways (i.e., inhalation, dermal contact, ingestion). The COCs include 18 VOCs and two polycyclic aromatic hydrocarbons (PAHs). Univar developed the COC list based on historical operations, identified spills/releases, environmental sampling results, and ICM monitoring.

### 2.3.1.1

#### *Interim Corrective Measures*

Univar has implemented a number of ICMs in accordance with the 1988 AOC, beginning in 1992 with a pilot-scale soil vapor extraction system (SVE) system. A groundwater ICM, consisting of three groundwater extraction wells, was installed during late 2001 and early 2002. The groundwater ICM, which began operations in March 2002, provides hydraulic control of the groundwater contamination at the north and south ends of the Property and also removes contaminant mass. The system is currently extracting groundwater from two extraction wells (EXW-2 and EXW-3A) at a total rate of approximately 6.3 gallons per minute (gpm). The extracted groundwater is treated by air stripping in the water treatment system (WTS) and discharged to the COP-owned 42-inch stormwater line via catch basin CB-4C (Figure 3) under NPDES Waste Discharge Permit No. 101613. Catch basin CB-4C discharges to the COP-owned 42-inch stormwater line, which ultimately drains nearly one-half mile away to the Willamette River. Monthly compliance samples are collected and reported to the ODEQ in Discharge Monitoring Reports in accordance with NPDES Permit No. 101613. Stormwater discharges from the Property were also regulated under this same permit until 2010.

Monthly compliance monitoring samples are collected from the WTS discharge and analyzed for VOCs, cyanide, oil and grease, and pH in accordance with NPDES Waste Discharge Permit No. 101613. Additional characterization samples collected between October 2010 and October 2013 evaluated total arsenic, dissolved arsenic, total iron, dissolved iron, total manganese, and dissolved manganese in the WTS discharge.

The Property's ICM system includes an SVE system consisting of six SVE wells and four groundwater extraction wells. The SVE vapors and air stripper off-gases are combined and treated in a granular activated carbon vapor phase treatment system. Results of current ICM activities were presented in the most recent quarterly progress reports submitted by Univar to USEPA (ERM 2015a, 2015b).

### 2.3.2

#### *Historical Stormwater Discharge Monitoring*

Univar discharged stormwater in accordance with NPDES Waste Discharge Permit No. 101613 until such requirements ended in 2010. Pursuant to the NPDES Waste Discharge Permit, Univar implemented stormwater pollution control measures and conducted routine stormwater sampling documented in the former Stormwater Pollution Control Plan ([SWPCP], PES 2008).

Univar collected stormwater samples twice per year between 2001 and 2010 from three discharge points (STM-1, CB-2E, and Spill Prevention Control and Countermeasure [SPCC] Control Valve E-1) as shown on the site utility map presented as Figure 3. Samples were analyzed for copper, lead, zinc, oil and grease, total suspended solids (TSS), and pH. Stormwater sampling results for samples collected between 2001 and 2010 are provided in Appendix A and summarized as follows:

- Total copper concentrations were above SLVs and generally below the NPDES Permit benchmark of 100 micrograms per liter ( $\mu\text{g/L}$ ) and were observed to range from 4.53  $\mu\text{g/L}$  to 108  $\mu\text{g/L}$  with an average of 27  $\mu\text{g/L}$ .
- Total lead concentrations were above SLVs and below the NPDES Permit benchmark of 400  $\mu\text{g/L}$  and were observed to range from 3.2  $\mu\text{g/L}$  to 141  $\mu\text{g/L}$  with an average of 20  $\mu\text{g/L}$ .
- Total zinc concentrations were generally below the NPDES Permit benchmark of 600  $\mu\text{g/L}$  and were above SLVs and were observed to range from 54.9  $\mu\text{g/L}$  to 824  $\mu\text{g/L}$  with an average of 214  $\mu\text{g/L}$ .
- Oil and grease concentrations were generally below the NPDES Permit benchmark of 10  $\mu\text{g/L}$  and were observed to range from 5.2  $\mu\text{g/L}$  to 16  $\mu\text{g/L}$  with an average of 9.2  $\mu\text{g/L}$ .
- TSS concentrations were generally above the NPDES Permit benchmark and were observed to range from 7  $\mu\text{g/L}$  to 1,420  $\mu\text{g/L}$  with an average of 141  $\mu\text{g/L}$ .
- pH was generally within NPDES Permit benchmarks of 5.5 to 9.0 and was observed to range from 4.9 to 9.6 with an average of 7.0.

Univar's NPDES Permit No. 101613 was originally issued in 1998 and renewed in 2004 and 2010. During the permit reapplication process in 2010, ODEQ determined that stormwater runoff from the Univar Property would no longer need to be regulated under the re-issued NPDES permit based on Univar's primary Standard Industrial Classification (SIC) code of 5169 (Chemicals and Allied Products), which does not require stormwater to be regulated under the NPDES General 1200Z Permit. As a result, stormwater monitoring and reporting requirements were eliminated on 20 September 2010 (ODEQ 2010). However, Univar has continued to maintain and implement a SWPCP for the Property as a BMP.

### 2.3.3

#### *Stormwater Line Inspections*

A COP-owned 42-inch stormwater line runs along the Property's eastern boundary and the boundary of the adjacent property, Container Recovery Inc. The COP's stormwater line transports stormwater runoff and other discharges from numerous upstream industrial facilities in the east-central sub-basin to the COP Drainage Basin 18, including: ABF Freight Systems, Inc.; ANRFS Holdings, LLC; Wilhelm Trucking; Carson Oil; Portland Bolt & Manufacturing; Journal Graphics; and Bushnells Warehouse (COP 2013). Figures from the Drainage Basin 18 Summary Report that detail the Property's location and adjacent sites within the COP Drainage Basin 18 are included in Appendix B.

The COP-owned 42-inch stormwater line was sampled and inspected by Univar in 1996 and 2010 at the request of ODEQ and the COP. The purpose of the inspections was to assess the structural integrity of approximately 1,400 feet of the COP's stormwater line. The inspections are documented in the *Storm Sewer Main Video Survey, Summary Letter* (PES 2010b).

Video inspections of the COP-owned 42-inch stormwater line were conducted July through August 1996 and in June 2010 to assess the condition of the stormwater line and identify influent laterals from the Univar Property and adjacent properties (PES 2010). Laterals to the COP-owned 42-inch stormwater line identified in recent reviews of the video inspections by ERM are summarized in Table 2 and shown on Figure 3.

The inspections revealed the COP-owned 42-inch stormwater line to have several damaged, chipped, and pulled joints as well as areas of discolored piping and joints. The inspection also revealed that the stormwater line had a sagging section where approximately 12-inches of solids and water had accumulated. Despite the fact that numerous upstream and up-pipe industrial facilities and other businesses discharge stormwater, and likely groundwater, to this line, USEPA directed Univar to remove the stormwater line's accumulated solids prior to finalizing the required video inspection.

Wastewater and solids removed from the COP-owned 42-inch stormwater line in 2010 were sampled for disposal characterization. Two grab samples of the wastewater and one composite sample of the collected solids were collected and analyzed. The available characterization data from these samples indicated the presence of VOCs, metals, and pesticides at concentrations above SLVs.

Approximately 21.7 tons of solids were dewatered, placed in roll-off bins, and transported to Waste Management, in Arlington, Oregon for disposal as hazardous waste. The wastewater was treated with flocculent and activated carbon prior for discharge to the sanitary sewer under the Property's existing permit.

#### **2.3.4      *East Drive Re-Paving Soil Sampling***

Univar performed three rounds of soil sampling in 2002, 2007, and 2008 to characterize shallow soils prior to removal during re-paving of the eastern driveway between the eastern loading dock and the eastern Property line. A summary of the characterization data was presented in the Final SPI Work Plan (PES 2010). The east drive re-paving project was completed in June 2013 and, as a result, shallow soils no longer represent a potential pathway to the stormwater system.

#### **2.3.5      *Stormwater Pathway Investigation***

The Draft SPI Report documented Univar's investigation efforts related to the Property's stormwater and preferential pathways to the COP Basin 18 stormwater conveyance system. The SPI activities completed and described within the Draft SPI Report are summarized as follows:

- Evaluated background information for the Property, including cleanup activities and operations relevant to stormwater pathways;
- Inspected the COP-owned 42-inch stormwater line and evaluated pipe integrity and the potential for groundwater infiltration to the stormwater line;
- Conducted stormwater sampling and flow monitoring of the COP-owned 42-inch stormwater line during three sampling events at locations upgradient and downgradient of the Property;
- Performed dry weather sampling of water within the COP-owned 42-inch stormwater line to evaluate a potential groundwater infiltration pathway;
- Conducted stormwater solids sampling and installed solids traps in the COP-owned 42-inch stormwater line at locations upgradient and downgradient of the Property; and
- Evaluated and compared stormwater, stormwater solids, and dry weather flow sampling results to SLVs.

COP and ODEQ comments on the Draft SPI Report required additional investigation efforts to complete the SWSCE, including the following:

- Collecting site-specific stormwater and stormwater solids data from all areas of the Property to identify contaminants of interest (COIs) for the stormwater pathway; and
- Evaluating groundwater infiltration pathways to determine whether additional source control measures were needed to address a potential preferential groundwater pathway to the river from the Property.

While additional investigation is required to complete the SWSCE process, dry weather sampling results from the previous SPI investigation can be used as a line of evidence for evaluating the potential for groundwater infiltration to serve as a source of contaminants to the Willamette River via the COP-owned 42-inch stormwater line. The Draft SPI Report identified eight COCs exceeding SLVs in the dry weather flow sampling results: PCE, TCE, VC, chloroform, and 1,1-dichloroethane (DCA), DDT (sum of 2,4' and 4,4'), arsenic, and manganese.

As discussed in Section 2.3.4, the COP-owned 42-inch stormwater line conveys stormwater from numerous other upstream and up-pipe industrial facilities, each of which is a potential source of contamination to the river. These facilities may also contribute to contaminants observed during dry weather flows as samples were only collected in the COP-owned 42-inch stormwater line.

## **2.4** ***CURRENT STORMWATER MANAGEMENT***

The Property is located within the Outfall 18 (OF 18) drainage basin of the Lower Willamette River Basin. The OF 18 drainage basin is a 465-acre stormwater basin on the west side of the Willamette River at approximately River Mile 8.8 that discharges to OF 18. Figure 1 shows the location of OF 18 and its associated drainage basin. The COP has divided the OF 18 drainage basin into five sub-basins. The Property is located within the east-central and west-central sub-basins (Appendix B). The majority of the Property (approximately 92 percent) drains to the east-central sub-basin, which covers approximately 37.5 acres comprised of mostly industrial properties. A small portion of the Property (approximately 8 percent) drains to the west-central sub-basin, which covers approximately 129 acres comprised of industrial properties and parks and open spaces.

The Property's storm drain system and associated drainage areas are shown on Figure 3. Univar maintains the Property's stormwater drainage system with the following exceptions:

- The COP-owned, maintained, and operated 42-inch stormwater line, which is located within an easement along the Property's eastern property boundary;
- The COP-owned 15-inch stormwater line which runs west to east across the southern portion of the Property from Index Steel and ties into the COP-owned 42-inch stormwater line at manhole AAX252; and
- The 8-inch stormwater line of unknown ownership which runs southwest to northwest from Index Steel and ties into the Drainage Basin 1 discharge at manhole STM-1.

The Univar-maintained stormwater drainage system includes roof drains, catch basins, stormwater conveyance piping, manholes, and emergency shut-off valves.

#### **2.4.1**      *Univar-Maintained Drainage System*

Stormwater runoff within the Property is collected by a series of catch basins and roof drains located throughout the Property. The catch basins route water through underground stormwater conveyance lines and manholes to COP-owned stormwater lines.

Figure 3 shows the Property's drainage basins, storm drain infrastructure and other pertinent Property features. A summary of drainage basin characteristics is provided in Table 1. The majority of collected runoff on the Property is discharged to a COP-owned 42-inch stormwater line that runs parallel and near the east property boundary. A small amount of runoff (from Drainage Basin No. 5) discharges to a COP-owned 42-inch stormwater line that services American Industries to the west. All stormwater runoff from the Property ultimately discharges nearly one-half mile away to the Willamette River.

The central and southern portions of the Property are the primary areas of industrial activity and consist mainly of chemical handling and storage operations. These areas are serviced by Drainage Basin Nos. 1, 2, 3, and 4.

- Drainage Basin No. 1 – Consists of approximately 93,848 square feet of impervious surfaces, including the southern half of the rail spur, drum fill area, and solvent tank farm area. Runoff from this basin combines with runoff from an adjacent property (Index Steel) at manhole STM-1

and discharges to the COP-owned 42-inch stormwater line through a single lateral.

- Drainage Basin No. 2 – Consists of approximately 105,253 square feet of impervious surfaces, including the eastern drive, covered drum storage structures, and the eastern half of the warehouse. Seven catch basins and four potential roof drain laterals are connected to the COP-owned 42-inch stormwater line. As discussed in Section 2.3.3, laterals to the COP-owned 42-inch stormwater line are summarized in Table 2 and shown on Figure 3. Five roof drains from the warehouse have one known active connection to the COP-owned 42-inch stormwater line. Dock drains E-5 and E-6 drain surface depressions in the covered drum storage area and occasionally collect a minimal amount of rainwater during heavy rain events. The collected water initially discharges through SPCC valves E-5 and E-6 to the paved surface, and then discharge via surface flow to catch basin CB-2G.
- Drainage Basin No. 3 - Consists of approximately 65,122 square feet of impervious surfaces in the center of the Property, including the corrosive tank farm and the central rail spur. Runoff from this basin discharges to the COP-owned 42-inch stormwater line through a single lateral.
- Drainage Basin No. 4 – Consists of approximately 75,664 square feet of impervious surfaces at the southern end of the Property, including the ICM building. Three catch basins connect to the COP-owned 42-inch stormwater line via two laterals. One roof drain directly connects to the COP-owned 42-inch stormwater line.

The final two discharge areas drain the northern portions of the Property where little or no industrial activity occurs.

- Drainage Basin No. 5 – Consists of approximately 34,756 square feet of impervious surface due west of the warehouse that is used for truck unloading to the warehouse and employee parking. Runoff from this basin is collected in four catch basins and conveyed by a single lateral to a COP-owned 42-inch stormwater line that services the American Industries site.
- Drainage Basin No. 6 - Consists of approximately 47,527 square feet of impervious surface at the northern end of the Property that is generally used for employee vehicle parking. Runoff from this basin is collected in five catch basins and conveyed to the COP-owned 42-inch stormwater line via a single lateral.

## 2.4.2

### *COP- and ODOT-Owned Stormwater Lines*

The COP-owned 42-inch stormwater line on the eastern boundary of the Property and the 42-inch line on the American Industries site convey stormwater from the Univar Property and adjacent and nearby properties. Both of these COP-owned 42-inch stormwater lines eventually flow to the north and connect to an Oregon Department of Transportation (ODOT)-owned 48-inch stormwater line, which is located in the frontage road adjacent to NW Yeon Avenue. This 48-inch stormwater line flows to the northwest and ultimately discharges to the Willamette River via OF 18 (PES 2012).

#### 2.4.2.1

##### *COP-Owned 42-inch Stormwater Line*

The COP-owned 42-inch stormwater line that runs south-to-north courses through and past the Univar Property prior to connecting to the ODOT-owned 48-inch stormwater line that ultimately discharges to the Willamette River. As described in Section 2.3.4 above, this COP-owned 42-inch stormwater line receives and transports substantial quantities of stormwater discharged from a significant number of industrial areas upgradient, downgradient, and adjacent to the Univar Property. The Univar Property and the adjacent American Industries property are geographically located at the furthest downstream end of the COP-owned 42-inch stormwater line's industrial drainage area. The following ODEQ ECSI sites are potential sources of stormwater contamination to the COP-owned 42-inch stormwater line:

- Container Recovery, Inc.;
- Wilhelm Trucking;
- Carson Oil;
- Container Management Services;
- Columbia American Plating Co.; and
- ANRFS Holdings Inc.

An evaluation of potential sources of contaminants to stormwater from these sites was presented in the *Completion Summary for City of Portland Outfall Basin 18* (COP 2013) and the *Portland Harbor Upland Source Control Summary Report* (ODEQ 2014). A summary of these reports' conclusions of is set forth below. The site summary rankings described are pending implementation of source control measures and/or BMPs. The ranking

may change based on future evaluations of the effectiveness of the source control actions at each site.

The adjacent **Container Recovery, Inc.** (ESCI #4015) site was considered to be a potential source of metals, PAHs, polychlorinated biphenyls (PCBs), and phthalates. In 2013 and 2014, the site was ranked as a low priority for source control, with verification of successful implementation of BMPs.

The adjacent **Wilhelm Trucking** (ESCI #69) site was determined to be a potential source of metals, phthalates, pesticides, total petroleum hydrocarbons (TPH), PAHs, and PCBs. Stormwater from Wilhelm Trucking was ranked as a low priority for source control following verification of successful implementation of upgrades and BMPs in 2013 (ODEQ 2014).

The upstream **Carson Oil** (ESCI #1405) site was determined to be a potential source of metals, VOCs, PAHs, PCBs, TPH, and phthalates. This site was ranked as a low priority for source control following implementation of line cleaning and other BMPs in 2012 to 2013.

The **Container Management Services** (ESCI #4784) site was determined to be a medium priority for source control for metals, TPH, PAHs, PCBs, pesticides, and phthalates. BMPs were implemented in 2011; however, the site is still considered to be an uncontrolled source of these contaminants and additional source control measures are required (ODEQ 2014).

The upstream **Columbia American Plating Co.** (ESCI #29) site was determined to be a potential source of VOCs, semi-volatile organic compounds (SVOCs), PCBs, metals, cyanide, PAHs, and phthalates in stormwater. The site was ranked as a low priority for source control following verification of successful implementation of stormwater line cleanout in 2009 and BMPs in 2011.

**ANRFS Holdings Inc.** (ESCI #1820) was determined to not be a source of contaminants to stormwater.

#### 2.4.2.1 *COP-Owned 42-inch Stormwater Line (American Industries Property)*

The COP-owned 42-inch stormwater line collects water from Drainage Area 5 in the northwestern portion of the Property (approximately 0.8 acres) along with a portion of the American Industries property located

west of the Property. The COP-owned 42-inch stormwater line conveys stormwater off site to the west-central sub-basin of OF 18.

### **2.4.3**      *Current Property Stormwater Controls*

Spill prevention measures are implemented at the Univar Property as described in the August 2014 SWPCP (ERM 2014). Below is a summary of the controls and BMPs that are currently implemented at the Property to prevent and minimize the potential for contaminants to enter the Property's stormwater system.

#### **2.4.3.1**      *Oil and Grease*

Spill response kits (i.e., absorbent pads and booms) are strategically located throughout the Property and are readily available in the unlikely event of a release to the ground surface. If oil is observed on the ground or in stormwater, oil-absorbent pillows and/or booms would be deployed in the immediate area and an assessment undertaken to identify and control the source, and modify practices if necessary to prevent a reoccurrence. No reportable petroleum spills have occurred at the Property.

#### **2.4.3.2**      *Waste Chemicals and Material Disposal*

Univar contains and manages waste chemicals in accordance with applicable federal and state regulations.

#### **2.4.3.3**      *Catch Basin Solids Control*

Standard "Lynch-style" catch basins equipped with inverted elbows and grate covers are used on the Property to trap solids and debris in stormwater runoff. The catch basins allow solids and debris to settle to the bottom of the basin, while the inverted elbow allows stormwater to flow to the stormwater system. To minimize solids and debris accumulation in the stormwater system: (a) paved areas are swept semi-annually by a street-sweeper; (b) catch basins are cleaned out on a quarterly basis; and (c) catch basin sorbent filter fabric inserts are used and maintained regularly.

#### **2.4.3.4**      *Stormwater Containment and Diversion*

Chemicals are stored and handled in covered dry package and covered drum storage areas (as shown on Figure 3) on pallets or in IBCs as appropriate. In other areas of the Property where operational activities

occur, chemical products are stored on elevated wood pallets or specialized chemical pallets. Stormwater is managed through the use of curbs, roof drains, floor drains, and catch basins appropriately and strategically located within drainage areas to capture runoff and divert flow to underground storm drains.

In addition to general secondary containment areas, the Property has two specific secondary containment areas associated with the solvent tank farm and the corrosive tank farm. The tank farms' secondary containment areas have no drains or outlets. When stormwater accumulates in the solvent tank farm's secondary containment area, it is inspected for visual observation of sheen. If there are no visual indicators of product releases in the stormwater, the stormwater is pumped to Drainage Basin 1 for discharge to the Property's stormwater system. If the stormwater has a visual sheen, it is pumped to barrels or tanker trucks to be transported off Property to a wastewater treatment plant. By contrast, stormwater accumulations in the corrosive tank farm's secondary containment areas are visually inspected, transferred to a neutralization tank, tested for pH, and neutralized as necessary before being discharged to the sanitary sewer under an Industrial Wastewater Discharge Permit (400.025).

#### 2.4.3.5 *Spill Prevention*

Univar's spill prevention and control measures are designed to prepare for, prevent, control and respond to oil releases. These SPCC measures include shut-off valves associated with the Property's stormwater piping. There are ten SPCC control valves and manholes on the Property to prevent releases of hazardous substances to the Property's catch basins, four on the west side and six on the east side, respectively (Figure 2). The SPCC control valves and manholes contain manually activated shut-off valves that can be closed in the event of a spill within one of the drainage areas serviced by these devices, thereby ensuring that spilled materials are contained on Property.

Univar also employs the following practices at the Property to further reduce the potential for spills to occur:

- Storing bulk hazardous materials in properly designed storage tanks located within secondary containment structures or in Department of Transportation (DOT) approved containers;
- Locating portable secondary containment vessels throughout the Property in the unlikely event of a breach of a product container or other release;

- Placing drip pans beneath hose fittings during rail car and tanker truck product transfers;
- Maintaining operating equipment in proper working order; and
- Regularly conducting inspections to ensure that equipment, product containers and the Property's stormwater system are in good order and working properly.

Additionally, all operations employees receive training in spill prevention, response, and reporting procedures and BMPs.

#### 2.4.3.6 *Spill Response*

Spill response procedures at the Univar Property are described in the August 2014 SWPCP (ERM 2014). Operations personnel at Univar are knowledgeable about the location and use of spill-cleanup equipment and tools. Spill response kits, equipment, and tools are used only to respond to spills and are maintained in good working order.

#### 2.4.3.7 *Preventative Maintenance*

The Univar Property is designed and operated to prevent hazardous substances from entering stormwater associated with industrial activities. The following BMPs are in place at the Univar Property:

- Hose pressure testing is conducted annually (all product hoses).
- Containment pans are used under all hose connections. Velcro tie straps are used on all camlock fittings (hose to truck, hose to pump, hose to tank valve) and, depending on the material, the hoses are purged with water, air, or nitrogen prior to breaking connections.
- Inspections are conducted of bermed secondary containment areas associated with tank storage on the Property to ensure they are working as intended.
- Monthly inventory is performed of the contents of emergency response kits.
- Site sweeping is performed bi-annually with a vacuum sweeper at industrial activity locations throughout the Property that include areas adjacent to the east loading dock, areas adjacent to the west loading dock, and general parking or storage areas when accessible.
- Visual inspection is performed prior to draining of bermed secondary containment areas around stormwater outlets that are normally closed;

these areas are drained only after confirmation that no chemical releases have occurred.

- Dike drain valves are checked monthly when not in use.
- DOT IBC leak test certificates are maintained to be current on all active containers.
- Stormwater control structures, treatment facilities, and material handling and storage facilities are cleaned biweekly.
- Catch basins are cleaned on a quarterly basis at the Property by removing catch basin inserts, vacuuming out water and solids, and replacing the catch basin inserts.

The volume of solids removed during catch basin cleaning cannot be determined from the available data, which includes the total volume removed of both water and solids in the catch basins. Power Mechanical Contracting is responsible for removing and delivering catch basin cleanout water to Pacific Power Vac (PPV) for treatment and processing. PPV receives an estimated 22,000 pounds (lb) of industrial storm water per cleanout. The estimated annual mass of catch basin solids and cleanout water is 88,000 lb. The PPV process includes analytical testing on inbound water, wastewater treatment, and outbound testing prior discharging to the sewer under their Industrial Wastewater Discharge Permit# 437.007.

Further discussion of stormwater BMPs and spill prevention measures at the Univar Property are described in the August 2014 SWPCP (ERM 2014).

### **3.0**      ***CONTAMINANTS OF INTEREST***

This section identifies the potential COIs that will be evaluated in the SWSCE process. Potential COIs are specific chemicals or categories of chemicals that are present in Univar's current operations or historical releases and would present an environmental concern if discharged to the river.

This section summarizes the chemicals associated with Univar operations and cleanup activities and provides the rationale for the selection of these chemicals as potential COIs.

#### **3.1**      ***RCRA CLEANUP ACTIVITIES***

As described in Section 2.3.1, VOCs and PAHs detected in soil and groundwater samples that were collected as part of RCRA remediation activities are considered COIs. VOCs and PAHs that are either listed as COCs in the CMS report (PES 2006) or are currently observed at detectable concentrations in groundwater are retained as potential COIs.

#### **3.2**      ***STORMWATER DISCHARGE MONITORING***

As described in Section 2.3.2, chemicals and parameters associated with historical stormwater discharge sampling included copper, lead, zinc, TSS, oil and grease, and pH. Copper, lead, and zinc were observed above SLVs and are therefore retained as potential COIs since this water directly discharges to the COP-owned and operated stormwater conveyance system.

#### **3.3**      ***STORMWATER LINE INSPECTIONS***

As described in Section 2.3.3, VOCs detected in solids samples associated with the 1996 line cleaning of the COP-owned 42-inch stormwater line included PCE, TCE, cis-1,2-DCE, ethylbenzene, toluene, and total xylenes. As described in Sections 2.3.3 and 2.4.2.1, drainage within the COP-owned 42-inch stormwater line includes numerous other upgradient, downgradient, and adjacent industrial facilities that are potential sources of stormwater contamination. Only those chemicals identified as potential COIs as part of Univar's own RCRA cleanup activities and its stormwater

discharge monitoring, line inspection, and pathway investigation activities are retained.

### **3.4      *STORMWATER PATHWAY INVESTIGATION***

As described in Section 2.3.5, dry weather sampling results from the Draft SPI Report identified eight COCs, including PCE, TCE, VC, chloroform, and 1,1-dichloroethane), DDT (sum of 2,4' and 4,4' isomers), arsenic, and manganese. As described in Sections 2.3.3 and 2.4.2.1, drainage within the COP-owned 42-inch stormwater line includes numerous other upgradient, downgradient, and adjacent industrial facilities that are potential sources of stormwater contamination. Those chemicals identified as potential COIs as part of Univar's RCRA cleanup activities historical stormwater discharge monitoring, line inspection, and pathway investigation activities have been retained as COCs for the purpose of evaluating the stormwater pathway.

### **3.5      *PORTLAND HARBOR AREA OF POTENTIAL CONCERN 19***

In accordance with the ODEQ request, the list of contaminants included as COCs in the SWSCSE includes those found elevated in the sediment area of potential concern (AOPC) where the site stormwater discharges from the City of Portland OF 18 to the Willamette River (i.e., AOPC 19).

It should be noted that observation of an "elevated" concentration of a given constituent in sediment near OF 18 does not necessarily indicate that a) the constituent originated from OF, b) the constituent is a source control driver, or c) that it originates from the Property. As described in the Basin 18 Completion Report (ODEQ, December 2013), the City of Portland has focused its OF 18 source tracing activities on PCBs, pesticides, and metals. According to the Basin 18 Completion Report, this list of analytes was based on the City's evaluation of 2007 to 2008 stormwater and stormwater solids trap sample data collected by the Lower Willamette Group in Basin 18 at a location representing discharge from OF 18.

The analytes considered for inclusion in the SWSCSE are as follows:

- Cadmium, copper, manganese, mercury, zinc, bis(2-ethylhexyl) phthalate, PCBs, PAHs, aldrin, dieldrin, endrin, DDx, and chloroethane are included as COCs for the SWSCSE.

- Catch basin solids samples will be analyzed for organochlorine pesticides. The results of catch basin solids screening will be used to guide decisions for potential additional stormwater sample analytes.
- As documented in Table 2.2-2 of the Draft Final Feasibility Study for Portland Harbor, several of the requested analytes identified as risk drivers at AOPC 19 have been eliminated as COCs in Portland Harbor. These analytes include: aluminum, barium, iron, silver, and delta-Hexachlorocyclohexane (delta-HCCH). Aluminum, barium, silver, and delta-HCCH were determined not to be ecologically-significant compounds and thus not retained as COCs. Iron was determined to be not a hazardous substance and not retained as a COC. Based on these conclusions, Univar is not proposing to analyze catch basin solids or stormwater discharge samples for these compounds.
- Dioxin/furans were not identified as constituents warranting source tracing based on the City's evaluation of existing storm water and stormwater solids trap data. The collection of dioxin/furan data by Univar, in the absence of a comprehensive data set for Basin 18, would not allow for informed source control decisions with regards to that constituent group. For these reasons, Univar is not proposing to analyze catch basin solids or stormwater discharge samples for dioxins/furans.

## 4.0

## *SAMPLE LOCATION RATIONALE*

Seven catch basin solid samples and 13 stormwater samples will be collected from locations within each drainage area to characterize the potential stormwater pathways associated with Univar operations throughout the Property. Additionally, one groundwater infiltration sample will be collected to characterize the potential impacts to the stormwater pathway associated with known groundwater contamination at the Property. This section describes the rationale for selection of sample locations which are characteristic of each potential stormwater pathway at the Property.

## 4.1

### *CATCH BASIN SOLIDS SAMPLING LOCATIONS*

Six catch basins (CB-1G, CB-2E, CB-3E, CB-4A, CB-5A, and CB-6A) and one trench drain (Trench-1) at the Property have been selected for catch basin solids sampling based on the following general criteria:

- Representative of the industrial activities that occur at the Property;
- Centrally located in drainage zones;
- Located in work areas that generate particulates or where hazardous materials are stored/handled;
- Located directly within work areas; and
- Located near stormwater drains that connect to COP-owned and operated stormwater lines.

Figure 4 presents the seven proposed catch basin solids sampling locations. Table 3 and Table 4 present the rationale and proposed analyses for selection of each catch basin solids sampling location, respectively. If, during field reconnaissance, it is determined that a catch basin does not contain sufficient sample volume, additional sample volume will be obtained by compositing available solids from the selected catch basin with those radiating out from it within the same drainage basin. Efforts will be made to select additional catch basins for compositing that meet the same sampling objectives and criteria as the originally-planned catch basin.

## 4.2

### ***STORMWATER SAMPLING LOCATIONS***

Six catch basins (CB-1G, CB-2E, CB-3E, CB-4A, CB-5A, and CB-6A), three SPCC control valves (E-1, E-6, and W-4), one manhole (STM-1), and one trench drain (Trench-1) at the Property have been selected for stormwater grab sampling based on the following general criteria:

- Representative of areas where activities or hazardous materials stored/handled may affect stormwater runoff;
- Locations spread geographically across the Property;
- Locations that are feasible for specified type of sample collection based on site reconnaissance; and
- Areas that have not already undergone stormwater characterization efforts by other parties.

Additionally, two roof drains (Roof-1 and Roof-2) at the Property have been selected for stormwater grab sampling based on the following general criteria:

- Locations characteristic of the roof materials used on the Property.

Figure 5 presents the proposed stormwater sampling locations. Table 3 and Table 4 present the rationale and proposed analyses for selection of each sampling location, respectively.

## 4.3

### ***GROUNDWATER INFILTRATION SAMPLING LOCATION***

As described in Section 2.3.1, groundwater impacts at the Property include 18 VOCs and two PAHs. The extent of groundwater impacts has been delineated using the existing network of groundwater monitoring wells, as detailed in the most recent (May 2015) isoconcentration contour maps (ERM 2015b). Figures C1 and C2 in Appendix C present the isoconcentration contours for total chlorinated VOCs (cVOCs) and total non-chlorinated VOCs (ncVOCs) in shallow groundwater in May 2015, respectively. The isoconcentration contour maps indicate the following:

- Groundwater in the vicinity of the COP-owned 42-inch stormwater line and the ODOT-owned 48-inch stormwater line have limited impacts, with total cVOC concentrations of less than or equal to 100 µg/L.

- ncVOCs were not detected in areas in the vicinity of the COP-owned 42-inch stormwater line and the ODOT-owned 48-inch stormwater line.
- ICMs discussed in Section 2.3.1.1, which include hydraulic capture of groundwater, have been effective at containing groundwater contamination on site (ERM 2015b).

Per the letter agreement with ODEQ, it is Univar's intent to utilize the previous groundwater infiltration pathway investigation documented in the Draft SPI Report as a starting point for the evaluation of the potential for contaminated groundwater to be preferentially transported in or along stormwater lines. The development and evaluation of additional information on the groundwater infiltration pathway will include the following:

- Seasonal high groundwater elevations in relation to elevations of piping that could preferentially transport groundwater, including the 42-inch City line and site laterals (where elevation data is available) and the downgradient ODOT line;
- Groundwater gradient and contaminant concentrations in the plume in relation to an intersection with any of these lines; additional observations of potential dry-weather flow in yet unobserved lines with appropriate seasonal timing considerations; and
- Visual inspection of the STM-1 location for dry weather flow on a quarterly basis and potential additional seasonally relevant sampling, as warranted by the observations.

One groundwater infiltration sample will be collected during dry weather from the lateral connecting to manhole AAT564. Field observations indicate groundwater is infiltrating into the stormwater line between SPCC control valve E-1 and manhole AAT564. The sample location is considered representative of the groundwater which may be leaving the site through infiltration into the stormwater system on the eastern and northern property boundaries. Table 3 and Table 4 present the rationale and proposed analyses for the sampling location, respectively.

## 5.0

### CATCH BASIN SOLIDS SAMPLING METHODOLOGY

Catch basin solids represent a time-integrated snapshot of solids that have the potential to be discharged to the river if not properly managed and contained. Seven catch basin solids sampling locations were selected to ensure that any solids present will be characteristic of the various operational activities being conducted at the Property. Once collected, the solids will be sampled and the samples analyzed for the parameters selected as potential COIs. Catch basin solids results will be compared against JSCS SLVs. If site concentrations exceed SLVs, a qualitative or quantitative weight-of-evidence evaluation will be performed to determine whether more aggressive stormwater investigation and/or source control measures are needed. This section describes the proposed sample analytical parameters and activities to be completed as part of the catch basin sampling scope of work.

## 5.1

### SAMPLING PROCEDURES

The residual solids in catch basins are inherently variable due to the varying physical characteristics of the catch basins, flow entering the catch basins, and activities performed in the drained areas. The field procedures described in this SWSCE Work Plan are designed to standardize the collection of samples in order to improve data quality by providing representative and comparable environmental samples of the solids in the stormwater catch basins.

Catch basin sampling will be performed in general accordance with the procedures described in *Standard Operation Procedures, Guidance for Sampling of Catch Basin Solids* prepared for the COP in July 2003. The methods are summarized below, with detailed standard operating procedures (SOPs) included in Appendix D.

Sampling priority will be given to chemical analyses, rather than physical analyses. Therefore, if limited solids volume is available from a given catch basin, the chemical analytical samples will be collected. If, during field reconnaissance, it is determined that a catch basin does not contain sufficient sample volume, the sample will be obtained by compositing available solids from the selected catch basin with those radiating out from it within the same drainage basin. Efforts will be made to select additional catch basins for compositing that meet the same sampling objectives and criteria as the originally planned catch basin.

### **5.1.1**      *Documentation*

Prior to sample collection, the catch basin or trench drain will be inspected. Information about the catch basin will be recorded on the field sampling data sheet. This information will describe surrounding operational activities, the general condition of the catch basin and any installed equipment (e.g., filter socks, biofilter bags), the presence of overlying water, the amount of solids retained, and sampling equipment used. Field activities associated with sample collection will be documented in the field log book, as per the SOP (Appendix D).

As part of the sample management procedures described in the QAPP (Appendix F), each catch basin solids sample will be logged on a chain-of-custody form. Information on the chain-of-custody form will include the sample name, date and time of collection, sampling method, and analyses to be performed.

### **5.1.2**      *Equipment Selection*

The method of catch basin sampling to be used is dependent on the depth of the catch basin, the presence of overlying water, and the water content of the residual solids. The catch basin will be probed with a stainless steel rod to determine the depth of solids and any overlying water.

For catch basins that contain no or little water, sampling equipment will include a stainless steel trowel or spoon for shallow basins and a stainless hand auger for deeper basins. Catch basins with overlying water that can be pumped off will be sampled using the same techniques for those with little or no water once the overlying water is removed. For catch basins that contain a significant quantity of water that cannot be easily removed, sampling equipment will include a hand corer or dredge sampler to prevent fines loss.

Figure 1 in Appendix D presents a flow chart for determining the appropriate sampling equipment to be used for the conditions encountered. Detailed descriptions of each sampling procedure, including the procedure for pumping off overlying water, are presented in Appendix D.

### **5.1.3**      *Preparation and Decontamination*

Prior to collecting samples at each catch basin, the non-disposable sampling equipment will be decontaminated using the method described

in the SOP (Appendix D). In general, the decontamination procedure will consist of washing the equipment with a phosphate-free detergent and tap water rinse. The equipment will then be rinsed with deionized water and then a final rinse with laboratory grade deionized water.

#### **5.1.4 *Sample Collection and Handling***

The objective of sampling is to obtain a representative sample of the material in the catch basin for source tracing purposes. Therefore, the material collected should be collected from material above the catch basin filter insert. If significant solids are not present in the selected catch basin above the filter insert, individual samples will be collected from below the catch basin insert in each of the four corners and the center of the basin and mixed in a stainless steel bowl. A single representative composite sample will then be collected from the catch basin material.

The sample will be placed into an appropriate sample container provided by the analytical laboratory, sealed with a Teflon-lined lid, and labeled. Information on the sample label will include the sample name, collection date and time, project identification, and the sampler's initials. The samples will be packaged to prevent breakage, placed in laboratory supplied coolers, and chilled with ice. The samples will be submitted to the laboratory under the chain-of-custody procedures described in Appendix F.

### **5.2 *ANALYTICAL PARAMETERS***

Only those chemicals related to Univar's historical operations and cleanup that are listed on the Portland Harbor JSCS Table 3.1 are identified as potential COIs for evaluation in the SWSCE Work Plan. Based on the potential sources to the stormwater pathways described in Sections 2.0 and 3.0 and requests from the ODEQ, the catch basin solid samples will be analyzed for the parameters identified in Table 5, including:

- Metals by USEPA Method 6020A;
- Mercury by USEPA Method 7471A;
- PCBs by USEPA Method 8082A;
- VOCs by USEPA Method 8260C;
- PAHs and phthalates by USEPA Method 8270D; and
- Organochlorine Pesticides by USEPA Method 8081A.

Table 5 includes the laboratory analytical methods, reporting limits, and SLVs (ODEQ 2005) for catch basin solids analyses.

### 5.3 *FIELD QUALITY CONTROL SAMPLES*

Quality control samples will be collected during the sampling events. One of each of the following control samples will be collected and analyzed for all of the parameters listed in Table 5 for each sampling event:

- Equipment rinsate; and
- Matrix spike (MS).

Analyses of the catch basin solids will be conducted by Test America Laboratories of Portland, OR. Contact information is as follows:

Kathy Kreps, Client Relations Manager  
Sarah Murphy, Project Manager  
(253) 922-2310  
[sarah.murphy@testamericainc.com](mailto:sarah.murphy@testamericainc.com)

Laboratory analyses, quality control, and data validation and management will be conducted in accordance with the project QAPP, provided in Appendix F.

### 5.4 *REPORTING OF RESULTS*

Following receipt of the analytical results, a data report will be prepared summarizing the results of the catch basin solids sampling. The report will be submitted to the ODEQ and will include:

- Identification of the stormwater catch basins that were sampled;
- Discussion of any deviations in the field work from the scope described in this SWSCE Work Plan;
- Presentation and discussion of the analytical results, including a comparison of sampling results to JSCS SLVs;
- Performance of a weight of evidence evaluation, if necessary (i.e., if concentrations exceed JSCS SLVs);
- Discussion of the quality assurance/quality control review of the analytical data; and

- Recommendations for modifications to stormwater characterization analytes (if necessary) will be based on an evaluation of catch basin solids results.

Catch basin solids sampling results from potential COIs identified within this SWSCE Work Plan will be compared against JSCS SLVs. If site concentrations exceed SLVs, a qualitative or quantitative weight-of-evidence evaluation will be performed to determine if additional stormwater investigation and/or source control are needed.

## 6.0

## STORMWATER SAMPLING METHODOLOGY

This section describes the proposed analytical parameters and activities to be completed as part of this stormwater sampling scope of work. Stormwater sampling for this SWSCE Work Plan will include grab sampling during four storm events between winter 2015 and spring 2016.

## 6.1

## SAMPLING PROCEDURES

To ensure that adequate stormwater runoff volumes will be available for stormwater sampling, Univar will make reasonable efforts to conduct the stormwater sampling described in this SWSCE Work Plan when a storm event is anticipated that meets the following criteria (from Appendix E of the JSCS):

- Antecedent dry period of at least 24 hours (as defined by less than 0.1 inch over the previous 24 hours);
- Minimum predicted rainfall volume of greater than 0.2 inch per event; and
- Expected duration of storm event is at least 3 hours.

Online access to the COP rain gauges ([http://or.water.usgs.gov/non-usgs/bes/raingage\\_info/clickmap.html](http://or.water.usgs.gov/non-usgs/bes/raingage_info/clickmap.html)) will be utilized to evaluate the antecedent dry period criteria and target storm event rainfall distribution and totals. Additional information will be collected from the National Weather Service Forecast Weather Table Interface for Portland, Oregon available at: <http://www.wrh.noaa.gov/forecast/wxtables/index.php?wfo=pqr>. It is recommended, but not required, that sampling events are a minimum of 10 days apart.

In accordance with ODEQ stormwater source control evaluation guidance, each stormwater sampling location will be sampled twice during “first flush” conditions, which is defined to be within the first 30 minutes of discharge at Manhole STM-1, SPCC control valve E-6, SPCC control valve E-1, catch basin CB-4A, catch basin CB-5A, and catch basin CB-6A (see Figure 5). The first flush is representative of a worst-case scenario of stormwater quality for contaminants mobilized by surface runoff.

The stormwater samples will be collected in accordance with the SOPs presented in Appendix E. Additionally, the sample bottles used will be

certified clean and phthalate-free. Samples will be packaged to prevent breakage, placed in coolers, and chilled with ice for transport to the laboratory. The stormwater samples will be analyzed for pH, conductivity, turbidity, and temperature at the laboratory within 24 hours of sample collection.

## 6.2 *ANALYTICAL PARAMETERS*

Only those chemicals related to historical operations and cleanup that are listed on the Portland Harbor JSCS Table 3.1 are identified as potential COIs for evaluation in the SWSCE Work Plan. Based on the potential sources to stormwater on site described in Sections 2.0 and 3.0, and requests from the ODEQ, the stormwater samples will be analyzed for the parameters identified in Table 6. Results from the catch basins solids will be used to screen the proposed potential COIs for stormwater. ODEQ will be provided the opportunity to review and comment on any proposed changes to potential COIs for stormwater sampling. This analyte list includes the following:

- Metals by USEPA Method 6020\_LL;
- Mercury by USEPA Method 7041A;
- PCBs by USEPA Method 8082A;
- VOCs by USEPA Method 8260C Low Level;
- PAHs and phthalates by EPA Method 8270D or 8270D SIM;
- Organochlorine Pesticides by USEPA Method 8081A Low Level;
- Total Suspended Solids by USEPA Method 2540D; and
- pH by USEPA Method 9040.

Table 6 includes the laboratory analytical methods laboratory reporting limits for stormwater analyses.

## 6.3 *FIELD QUALITY CONTROL SAMPLES*

Quality control samples will be collected during the sampling events. Field quality control samples will be collected as described in the QAPP (Appendix F). One of each of the following control samples will be collected and analyzed for all of the parameters listed in Table 6 for each sampling event:

- Equipment rinsate;
- Matrix spike/ matrix spike duplicate (MS/MSD); and
- Field (blind) duplicate.

Analyses of the stormwater will be conducted by Test America Laboratories of Portland, Oregon. Contact information is as follows:

Kathy Kreps, Client Relations Manager  
 Sarah Murphy, Project Manager  
 (253) 922-2310  
[sarah.murphy@testamericainc.com](mailto:sarah.murphy@testamericainc.com)

Laboratory analyses, quality control, and data validation and management will be conducted in accordance with the project QAPP, provided in Appendix F.

## 6.4 *REPORTING OF RESULTS*

Following receipt of the analytical results, a SWSCE report will be prepared summarizing the results of the stormwater sampling. The results will be reported in accordance with Appendix A of the ODEQ's draft guidance for stormwater evaluations (ODEQ 2010). The report will be submitted to the ODEQ and will include:

- Identification of the stormwater locations that were sampled.
- A discussion of sampling activities and any deviations in the field work from the scope described in this SWSCE Work Plan.
- Field documentation (e.g., notes, photos).
- Rainfall distribution graph (hydrograph) for sampled storm event beginning 24 hours prior to beginning of storm with an indication of when flow commenced at the sampling location (if known) and the time sampling was conducted.
- Presentation and discussion of the analytical results, including a comparison to JSCS SLVs and performing a weight of evidence evaluation if necessary.
- Discussion of the quality assurance/quality control review of the analytical data.

Stormwater sampling results will be compared against JSCS SLVs. If Property concentrations exceed SLVs, and readily-available BMPs are not effective at reducing concentrations below the SLVs, a qualitative or quantitative weight-of-evidence evaluation is performed to determine if more aggressive stormwater investigation and/or source control are needed.

## **7.0**                      ***GROUNDWATER INFILTRATION SAMPLING METHODOLOGY***

This section describes the proposed sample analytical parameters and activities to be completed as part of the groundwater infiltration sampling scope of work.

### **7.1**                      ***SAMPLING PROCEDURES***

Univar will make reasonable efforts to collect the groundwater sample following an antecedent dry period of approximately 48 hours.

Information will be recorded on the field sampling data sheet. This information will describe surrounding operational activities and the general condition of manhole. Field activities associated with sample collection will be documented in the field log book.

As part of the sample management procedures, the groundwater sample will be logged on a chain-of-custody form. Information on the chain-of-custody form will include the sample name, date and time of collection, sampling method, and analyses to be performed.

The groundwater infiltration sample bottles used will be certified clean and phthalate-free. Sample containers will be packaged to prevent breakage, placed in coolers, and chilled with ice for transport to the laboratory.

### **7.2**                      ***ANALYTICAL PARAMETERS***

Only those chemicals related to historical operations and cleanup that are listed on the Portland Harbor JSCS Table 3.1 are identified as potential COIs for evaluation in the SWSCE Work Plan. Based on the potential sources to stormwater on site described in Sections 2.0 and 3.0, the groundwater sample will be analyzed for the parameters identified in Table 6. This analyte list includes the following:

- Metals by USEPA Method 6010B;
- Mercury by USEPA Method 7041A;
- PCBs by USEPA Method SW8082;
- VOCs by USEPA Method 8260b;

- PAHs, and phthalates by EPA Method 8270C; and
- pH by USEPA Method 9040.

Table 6 includes the laboratory analytical methods laboratory reporting limits for groundwater analyses.

### 7.3 *QUALITY CONTROL*

Analyses of the sample will be conducted by Test America Laboratories of Portland, Oregon. Contact information is as follows:

Kathy Kreps, Client Relations Manager  
 Sarah Murphy, Project Manager  
 (253) 922-2310  
[sarah.murphy@testamericainc.com](mailto:sarah.murphy@testamericainc.com)

Laboratory analyses, quality control, and data validation and management will be conducted in accordance with the project QAPP, provided in Appendix F.

### 7.4 *REPORTING OF RESULTS*

Following receipt of the analytical results, the data will be reported in the SWSCE report. The report will be submitted to the ODEQ and will include:

- Discussion of any deviations in the field work from the scope described in this SWSCE Work Plan;
- Presentation and discussion of the analytical results, including a comparison of sampling results to JSCS SLVs;
- Performance of a weight of evidence evaluation, if necessary (i.e., if concentrations exceed JSCS SLVs); and
- Discussion of the quality assurance/quality control review of the analytical data.

## **8.0 SCHEDULE**

It is expected that the scope of work described herein will be completed in two phases as described below. The proposed project schedule is included in Appendix G.

### **8.1 PHASE 1 - CATCH BASIN SOLIDS SAMPLING**

It is expected that implementation of the catch basin solids sampling will begin immediately upon ODEQ approval of this SWSCE Work Plan. The expected duration of each project task is described below:

- Preparation, procurement, field coordination, and completion of catch basin sampling – 1 week;
- Laboratory analysis of samples and quality assurance/quality control of analytical data – 3 weeks; and
- Preparation of summary report including additional recommendations for stormwater sample parameters (if necessary) – 3 weeks.

### **8.2 PHASE 2 - STORMWATER SAMPLING AND GROUNDWATER PATHWAY EVALUATION**

It is expected that implementation of the scope of work described in Section 5.0 above will begin following completion of Phase 1 and upon ODEQ approval of this SWSCE Work Plan and recommendations provided in the Phase 1 summary report. The schedule below presents estimated completion dates for conducting the stormwater sampling (weather permitting) and groundwater infiltration pathway evaluation activities at the Property.

- ODEQ approval of Phase 2 – January 2015;
- Conduct first winter stormwater sampling event – January 2016;
- Conduct second winter stormwater sampling event – February 2016;
- Complete first quarterly visual inspection for dry weather flow – February 2016;
- Conduct first spring stormwater sampling event – March 2016;
- Conduct second spring stormwater sampling event – April 2016;

- Complete second quarterly visual inspection for dry weather flow – May 2016; and
- Complete third quarterly visual inspection for dry weather flow – August 2016.

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- PES. 2008. *Stormwater Pollution Control Plan, Portland, Oregon*, Prepared for Univar USA Inc. May.
- PES. 2010a. *Final Stormwater Pathway Investigation Work Plan, Univar USA Inc., Portland, Oregon*. March 29.
- PES. 2010b. *Storm Sewer Main Video Survey, Summary Letter, Univar USA Inc., Portland, Oregon*.

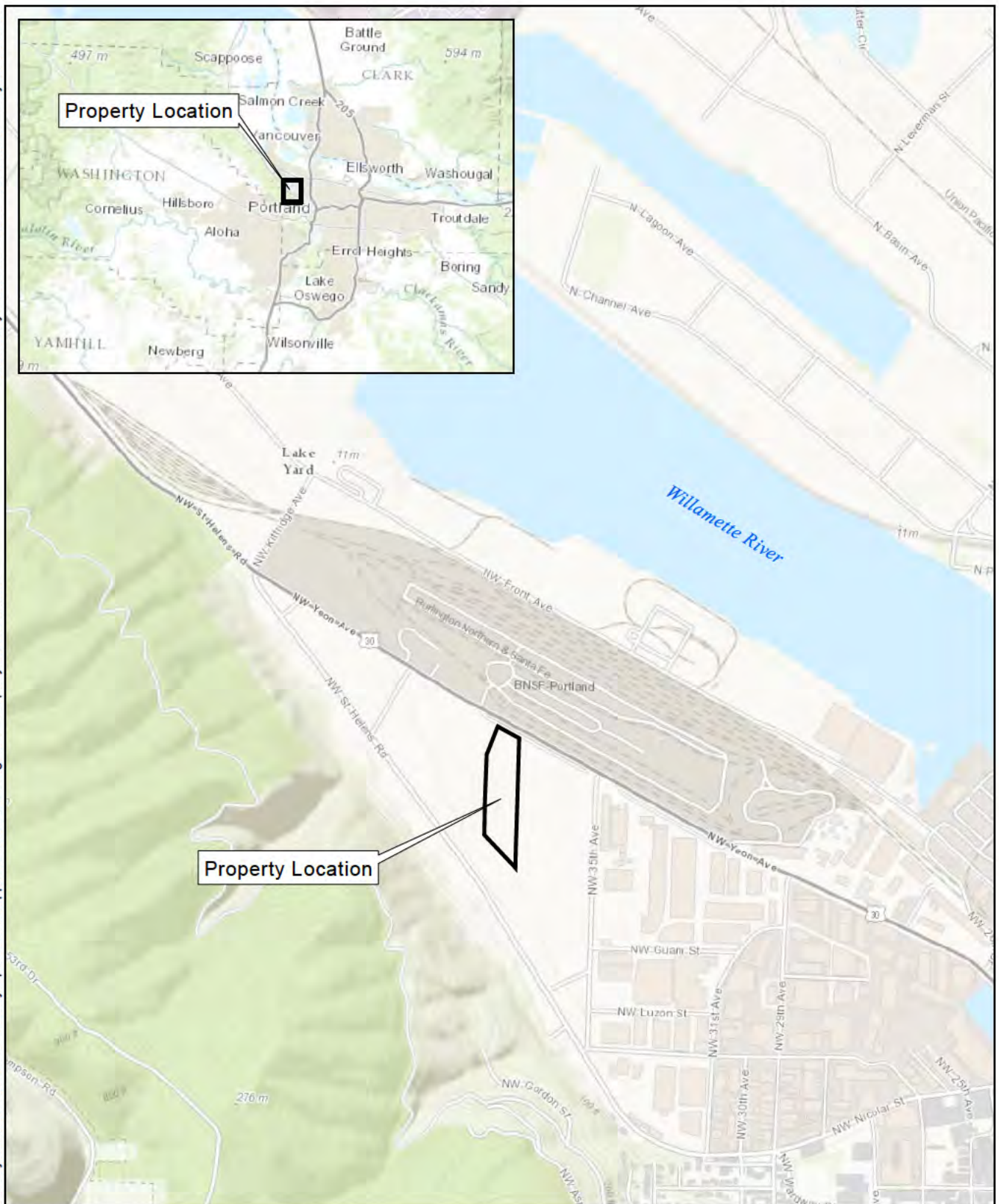
PES. 2012. *Draft Stormwater Pathway Investigation Report, Univar USA Inc., 3950 NW Yeon Avenue, Portland, Oregon. August 21.*

U.S. Environmental Protection Agency (USEPA). 2006. *Statement of Basis, Proposed RCRA Remedy Selection, Univar USA Inc., Portland, Oregon. August 17.*


USEPA. 1988. *Administrative Order on Consent RCRA Docket No. 1087-10-18-3008 for Corrective Measures Implementation at the Univar USA Inc., Portland, Oregon Facility, EPA ID No. ORD009227398. June 1.*

USEPA. 2007. *Amendment to the Administrative Order on Consent RCRA Docket No. 1087-10-18-3008 for Corrective Measures Implementation at the Univar USA Inc., Portland, Oregon Facility, EPA ID No. ORD009227398. August 1.*

## *Figures*



## Legend

-  Approximate Univar Property Boundary

0 750 1,500 3,000 Feet

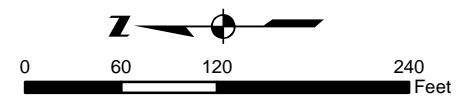


**Figure 1**  
*Property Location Map*  
**Univar USA Inc., NW Yeon Ave**  
**Portland, Oregon**



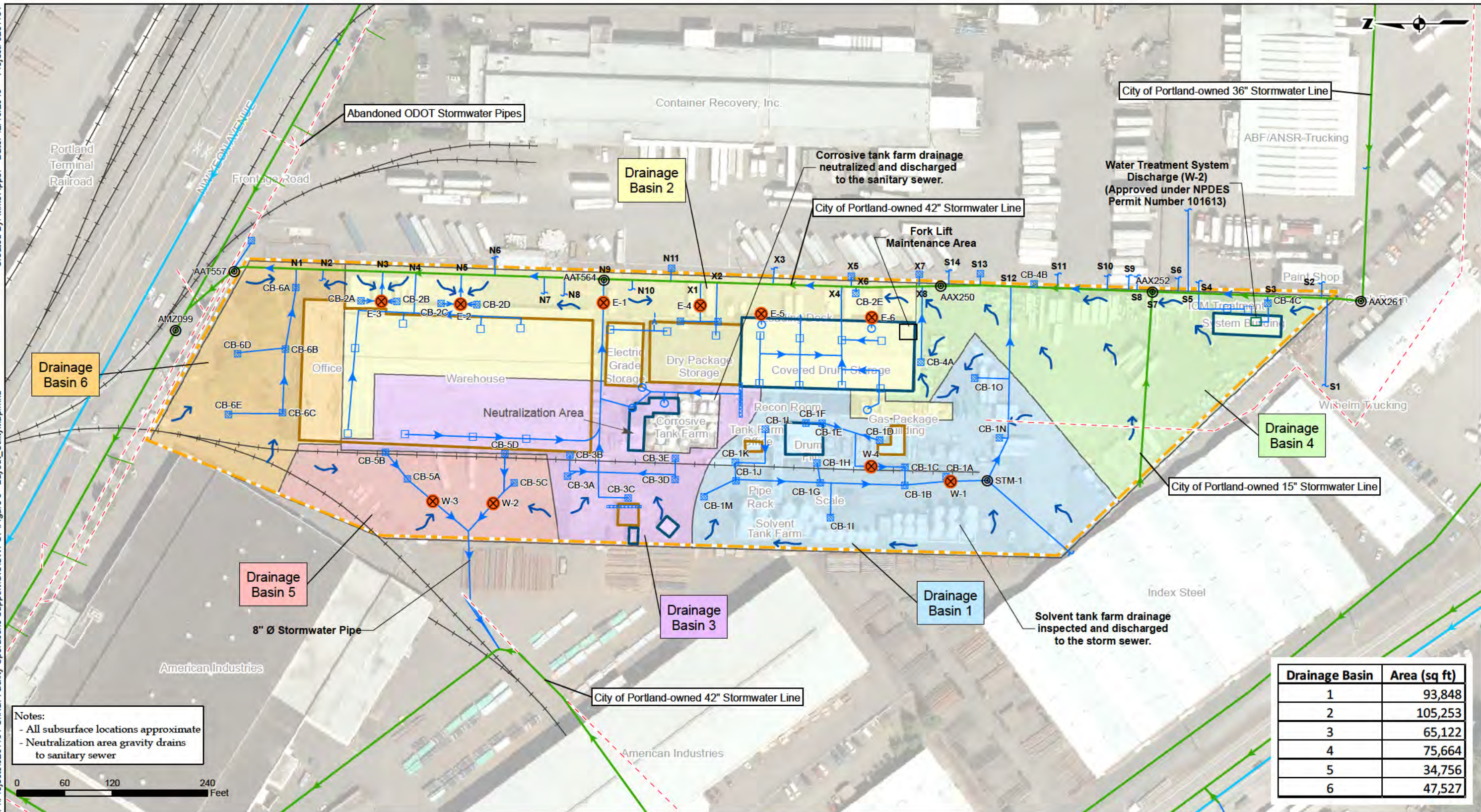
### Legend

- City of Portland Easement
- Quit Claimed Public Easement
- Approximate Univar Property Boundary
- Railroad Track



Aerial Image - USGS State Orthoimagery, July 2010, 0.5 ft per pixel

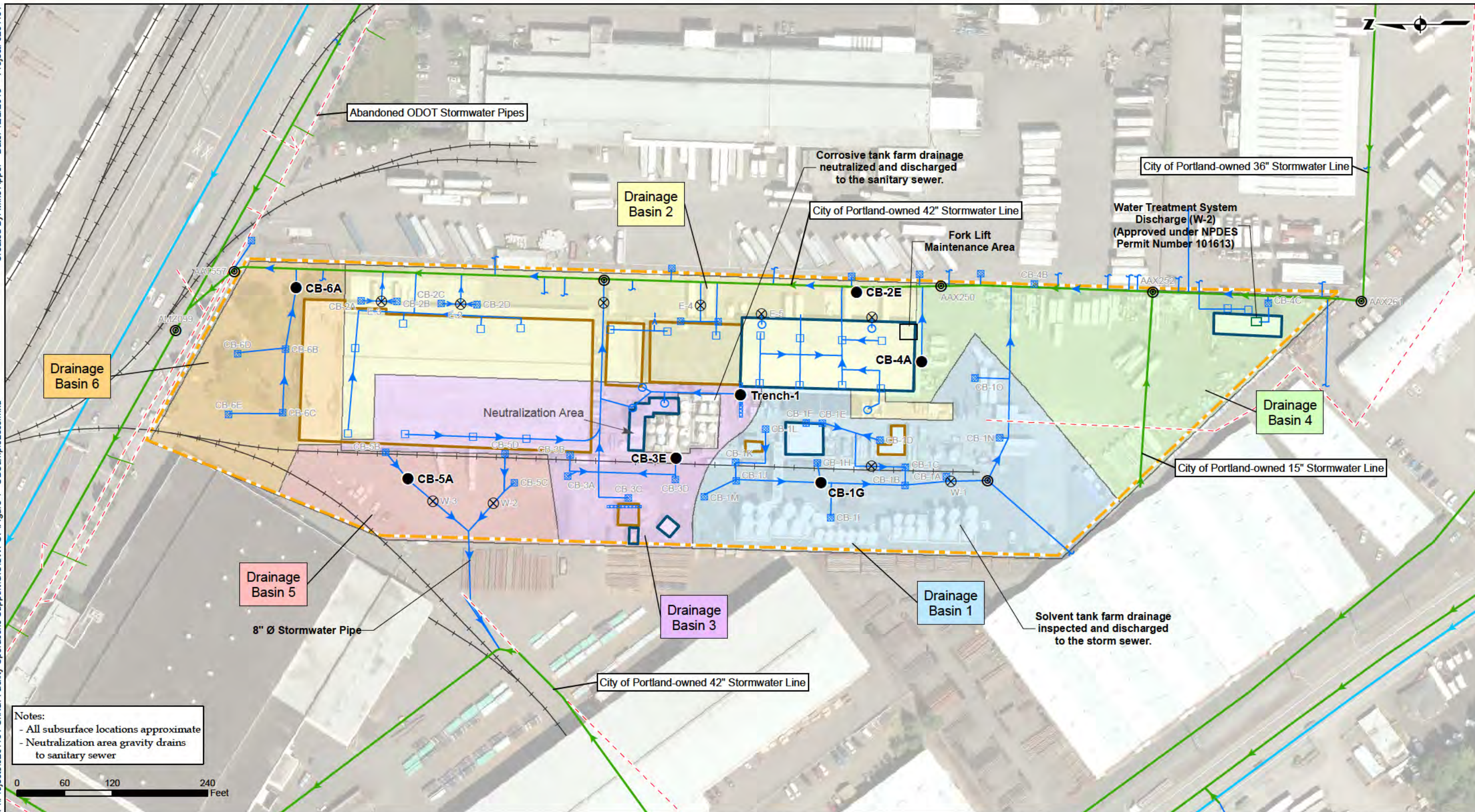
**Figure 2**  
*Property Vacinity Map*  
*Univar USA Inc., NW Yeon Ave*  
*Portland, Oregon*



**Legend**

- |                    |                                      |                  |                             |                           |                                    |
|--------------------|--------------------------------------|------------------|-----------------------------|---------------------------|------------------------------------|
| Catch Basin        | Railroad Track                       | Drainage Basin 2 | Corrugated Metal Roof       | Abandoned Sewer Pipes     | Generalized Surface Flow Direction |
| Floor Drain        | Approximate Univar Property Boundary | Drainage Basin 3 | Tar or Asphalt Shingle Roof | City Sanitary Sewer Pipes | Private Stormwater Pipe            |
| Roof Drain         | Drainage Basin 1                     | Drainage Basin 4 |                             |                           |                                    |
| SPCC Control Valve |                                      | Drainage Basin 5 |                             |                           |                                    |
| Storm Manhole      |                                      | Drainage Basin 6 |                             |                           |                                    |

**Figure 3**  
*Property Layout and Utility Map  
Univar USA Inc., NW Yeon Ave  
Portland, Oregon*

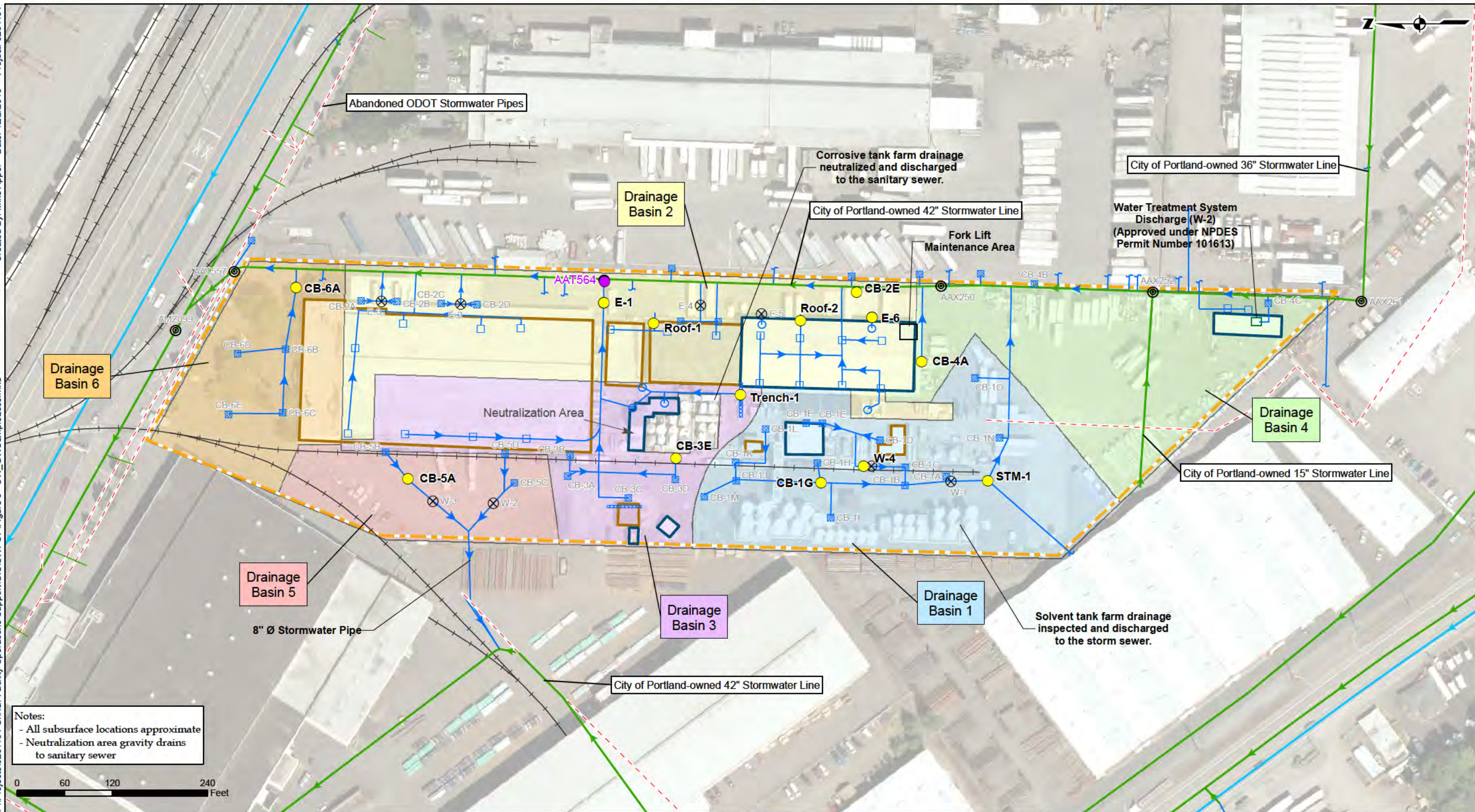


**Legend**

- |                                      |                      |  |                             |                             |                               |
|--------------------------------------|----------------------|--|-----------------------------|-----------------------------|-------------------------------|
| ● Catch Basin Solids Sample Location | ⊗ SPCC Control Valve | ⬡ Approximate Univar Property Boundary | ■ Drainage Basin 4          | → City Stormwater Pipe      | ▭ Corrugated Metal Roof       |
| ■ Catch Basin                        | ⊙ Storm Manhole      | ▭ Drainage Basin 1                     | ■ Drainage Basin 5          | - - - Abandoned Sewer Pipes | ▭ Tar or Asphalt Shingle Roof |
| ○ Floor Drain                        | — Railroad Track     | ▭ Drainage Basin 2                     | ■ Drainage Basin 6          | → City Storm Laterals       |                               |
| □ Roof Drain                         |                      | ▭ Drainage Basin 3                     | → City Sanitary Sewer Pipes | → Private Stormwater Pipe   |                               |

**Figure 4**  
*Catch Basin Solids Sample Location Map*  
Univar USA Inc., NW Yeon Ave  
Portland, Oregon

Aerial Image - USGS State Orthoimagery, July 2010, 0.5 ft per pixel



Notes:  
- All subsurface locations approximate  
- Neutralization area gravity drains  
to sanitary sewer

Legend

- |  |                      |  |                    |                             |                               |
|--|----------------------|--|--------------------|-----------------------------|-------------------------------|
| ● Stormwater Sample Location               | ○ Floor Drain        | — Railroad Track                       | ■ Drainage Basin 2 | — City Sanitary Sewer Pipes | — Private Stormwater Pipe     |
| ● Groundwater Infiltration Sample Location | □ Roof Drain         | — Approximate Univar Property Boundary | ■ Drainage Basin 3 | — City Stormwater Pipe      | ■ Corrugated Metal Roof       |
| ■ Catch Basin                              | ⊗ SPCC Control Valve | ■ Drainage Basin 1                     | ■ Drainage Basin 4 | --- Abandoned Sewer Pipes   | ■ Tar or Asphalt Shingle Roof |
|  | ⊙ Storm Manhole      |  | ■ Drainage Basin 5 | — City Storm Laterals       |                               |
|  |                      |  | ■ Drainage Basin 6 |                             |                               |

**Figure 5**  
**Stormwater and Groundwater Infiltration**  
**Sample Location Map**  
Univar USA Inc., NW Yeon Ave  
Portland, Oregon

Aerial Image - USGS State Orthoimagery, July 2010, 0.5 ft per pixel

## *Tables*

**Table 1**  
**Summary of Drainage Basins**  
**Stormwater Source Control Evaluation Work Plan**  
**Univar USA Inc.**  
**December 2015**

Drainage Basin	Number of Catch Basins	Approximate Area Drained (square feet)	Description	Connections to Stormwater Main
1	14	93,848	Nine catch basins drain the southern half of rail spur. Three catch basins drain the loading dock area which includes the drum fill area. Stormwater collected in the solvent tank farm area is inspected and discharged to the asphalt surface adjacent to CB-II. Two catch basins drain the general storage area south of the loading dock.	Single lateral from basin is directly connected to City of Portland-owned 42" stormwater line on site at the lateral identified as S12 on Figure 2.
2	6	105,253	Eastern portion of the site including east drive, covered storage structures, and the eastern half of the warehouse. Roof drains from tar and corrugated metal roofs tie into the 42-inch main and drain to the asphalt of concrete surface from the sides of the loading dock. Two floor drains within the covered storage area discharge stormwater collected in surface depressions to the concrete surface of the east drive.	1) 6 catch basins are directly connected to City of Portland-owned 42" stormwater line on site via 3 laterals 2) 3 roof drains are directly connected to City of Portland-owned 42" stormwater line on site 3) 2 catch basins and 1 underground lateral pipe are directly connected to the City of Portland-owned 42" stormwater line from off site
3	5	65,122	Three floor drains and one trench drain from the loading dock area adjacent to the corrosive tank farm and drum fill area. Roof drains from the warehouse tar roof. Five catch basins and one trench drain from the central rail spur area.	Lateral from basin is directly connected to City of Portland-owned 42" stormwater line on site.
4	3	75,664	Three catch basins drain the southern portion of site used for used container storage and truck parking. Drainage includes runoff from the remediation building corrugated metal roof.	1) 2 catch basins are directly connected to City of Portland-owned 42" stormwater line on site 2) 1 roof drain is directly connected to City of Portland-owned 42" stormwater line on site 3) 1 non-stormwater catch basin from remediation system is directly connected to City of Portland-owned 42" stormwater line on site 4) 2 underground lateral pipes without a surface access are directly connected to the City of Portland-owned 42" stormwater line on site 5) 2 catch basins and 5 underground lateral pipes are directly connected to the City of Portland-owned 42" stormwater line from off site
5	4	34,756	Four catch basins drain the north-western portion of site including rail spur, truck unloading, and employee parking.	1) Lateral from basin is directly connected to City of Portland-owned 42" stormwater line on American Steel property 2) Underground lateral pipe without surface access is directly connected to the City of Portland-owned 42" stormwater line on site
6	5	47,527	Five catch basins drain the northern portion of the site mainly used for employee parking.	Lateral from basin is directly connected to City of Portland-owned 42" stormwater line on site at the lateral identified as N9 on Figure 2.

**Notes:**

The ICM groundwater treatment system discharges treated groundwater via catch basin CB-4D directly to the City of Portland owned 42-inch stormwater line via NPDES Permit No. 101613. Stormflow connections are based on field observations, historical reports (BRI 2004, HLA 1996), and information obtained from City of Portland maps available online at <http://www.portlandmaps.com>.

**Table 2**  
**Stormwater Line Inspection Summary**  
**Stormwater Source Control Evaluation Work Plan**  
**Univar USA Inc.**  
**December 2015**

Manhole/Lateral	Size (in)	Material	Storm Water Flow <sup>1</sup> (Yes/No)	Influent Direction	Ownership	Observations
AA1577	-	-	-	-	City of Portland	Start of survey from the north Manhole not observed
N-1	6	PVC	Yes	West	Univar	Drainage Basin 1 employee parking lot catch basins
N-2	4	Cast Iron	No	West	Univar / Historical	Assumed to be an abandoned line; potential historical roof drain
N-3	4	PVC	Yes	West	Univar	Drainage Basin 2 east loading bay catch basins
N-4	6	Cast Iron	Yes	West	Univar	Drainage Basin 2 roof drains
N-5	4	PVC	Yes	West	Univar	Drainage Basin 2 east loading bay catch basins
N-6	4	Cast Iron	Yes	East	Container Recovery Inc	Drains adjacent property
N-7	4	Cast Iron	No	West	Univar / Historical	Observed to be defective and may be an abandoned line; potential historical roof drain
N-8	4	Cast Iron	No	West	Univar / Historical	Observed to be defective and may be an abandoned line; potential historical roof drain
N-9 / AAT564	8	Concrete / Brick	Yes	West	Univar	Drainage Basin 3 and upstream drainage to COP-owned 42" line
N-10	4	Cast Iron	No	West	Univar / Historical	May be an abandoned line; potential historical roof drain
N-11	4	Cast Iron	Yes	East	Container Recovery Inc	Sourced from adjacent property Flow observed during survey
AAX261	-	Brick	-	-	City of Portland	Start of survey from the south Manhole not observed
S-1	6	Concrete	No	West	Wilhelm Trucking	Sourced from adjacent property
S-2	4	Cast Iron	Yes	East	ABF/ANSR Trucking	Sourced from adjacent property
S-3	4	Cast Iron	No	West	Univar	WTS discharge
S-4	6	PVC	Yes	West	Univar	ICM roof drainage
S-5	12	Concrete	Yes	East	ABF/ANSR	Sourced from adjacent property
S-6	8	Concrete	Yes	East	ABF/ANSR	Sourced from adjacent property
S-7 / AAX252	8	Concrete / Brick	No	West	Index Steel	Sourced from adjacent property Potentially abandoned
S-8	6	Cast Iron	No	East	Container Recovery Inc	Sourced from adjacent property Potentially abandoned
S-9	6	Cast Iron	Yes	East	Container Recovery Inc	Sourced from adjacent property
S-10	6	Cast Iron	Yes	East	Container Recovery Inc	Sourced from adjacent property
S-11	4	Cast Iron	Yes	East	Container Recovery Inc	Sourced from adjacent property
S-12	8	Concrete	Yes	West	Univar	Sourced from Drainage Basin 1 and upstream drainage to COP-owned 42" line
S-13	6	Concrete	Yes	East	Container Recovery	Sourced from adjacent property
S-14	6	Cast Iron	Yes	East	Container Recovery	Sourced from adjacent property
AAX250	-	Brick	-	-	City of Portland	-
X-1	-	-	-	West	Univar	Abandoned
X-2	-	-	-	West	Univar	Drawings indicate this is sourced from Univar roof drains
X-3	-	-	-	East	Container Recovery Inc	Unknown
X-4	-	-	-	West	Univar	Drawings indicate this is sourced from Univar roof drains
X-5	-	-	-	East	Container Recovery Inc	Adjacent site CB
X-6	-	-	-	West	Univar	Drawings indicate this is sourced from Univar catch basin CB-2E
X-7	-	-	-	East	Container Recovery Inc	Adjacent site CB
X-8	-	-	-	West	Univar	Drawings indicate this is sourced from Univar catch basin CB-4A

**Notes:**

<sup>1</sup> = Flow observed during June 10, 2010 video survey Approximately 0.50 inches of precipitation observed at City of Portland HYDRA Rainfall Network northwest stations

<http://or.water.usgs.gov/non-usgs/bes/>

**Table 3**  
**Proposed Sampling Locations and Rationale**  
**Stormwater Source Control Evaluation Work Plan**  
**Univar USA Inc.**  
**December 2015**

Drainage Feature	Sample Site <sup>1</sup>	Location Identification	Sample Type	Selection Rationale
Drainage Basin 1	Manhole STM-1	STM-1	Stormwater	Storm manhole sample location for stormwater grab sample Represents Drainage Basin 1 runoff which includes drum fill area and solvent tank farm dock and loading areas
	SPCC control W-4	W-4	Stormwater	SPCC control valve location for stormwater grab sample Location is representative of dock area which includes solvent loading area runoff
	Catch basin CB-1G	CB-1G	Stormwater and Catch Basin Solids	Catch basin sample location for solids and stormwater Represents solvent tank farm area, drum fill area, railcar loading/unloading, and truck traffic drainage
Drainage Basin 2	Catch basin CB-2E	CB-2E	Stormwater and Catch Basin Solids	Catch basin sample location for solids and stormwater Represents truck traffic sample and covered drum area runoff
	SPCC control E-6	E-6	Stormwater	SPCC control valve location for stormwater grab sample Location is representative of covered drum area which includes forklift maintenance area runoff / pooled drainage
Drainage Basin 3	SPCC control E-1	E-1	Stormwater	SPCC control valve sample location for stormwater Represents Drainage Basin 3 runoff which includes neutralization area and corrosive tank farm dock and loading areas as well as runoff from tar roof materials
	Trench drain on dock	Trench-1	Stormwater and Catch Basin Solids	Trench drain location for solids and stormwater grab sample Location is representative of corrosive tank farm dock area which includes high forklift traffic area runoff
	Catch basin CB-3E	CB-3E	Stormwater and Catch Basin Solids	Catch basin sample location for solids and stormwater Represents corrosive tank farm loading area, railcar loading/unloading, and truck traffic drainage
Drainage Basin 4	Catch basin CB-4A	CB-4A	Stormwater and Catch Basin Solids	Catch basin sample location for solids and stormwater Represents truck traffic sample and empty drum/tote storage area runoff
Drainage Basin 5	Catch basin CB-5A	CB-5A	Stormwater and Catch Basin Solids	Catch basin sample location for solids and stormwater Represents Neutralization area loading area, railcar loading/unloading, and truck traffic drainage
Drainage Basin 6	Catch basin CB-6A	CB-6A	Stormwater and Catch Basin Solids	Catch basin sample location for solids and stormwater Represents employee parking lot and truck traffic sample No industrial activities
Roof Drainage	Dock drain; Drainage Basin 2	Roof-1	Stormwater	Roof grab sample representative of drainage from 100 percent tar roofed areas
	Dock drain; Drainage Basin 2	Roof-2	Stormwater	Roof grab sample representative of drainage from 100 percent corrugated metal roofed areas
Groundwater Infiltration <sup>2</sup>	Eastern property boundary; Storm manhole AAT564	AAT564	Groundwater Infiltration	Groundwater infiltration grab sample Field observations indicate groundwater infiltrating into pipe between SPCC control valve E-1 location and manhole AAT564

**Notes:**

<sup>1</sup> = Sample locations indicated are based on best available information Locations are to be field tested at a later date

<sup>2</sup> = Dry weather water flow observed during site visit in September 2015

**Table 4**  
*Sampling Matrix*  
*Stormwater Source Control Evaluation Work Plan*  
*Univar USA Inc.*  
*December 2015*

Sample Location	Location Identification	Catch Basin Solids Sampling						Stormwater Discharge and Groundwater Infiltration Sampling <sup>4</sup>						
		Metals <sup>1</sup>	VOCs <sup>2</sup>	PAHs	Phthalate Esters	PCBs <sup>3</sup>	Organochlorine Pesticides	Metals <sup>5</sup>	VOCs <sup>5</sup>	PAHs	Phthalate Esters	PCBs <sup>3</sup>	Organochlorine Pesticides	TSS
Manhole STM-1	STM-1							X	X	X	X	X	X	X
SPCC control W-4	W-4							X	X	X	X	X	X	X
Catch basin CB-1G	CB-1C	X	X	X	X	X	X	X	X	X	X	X	X	X
Catch basin CB-2E	CB-2E	X	X	X	X	X	X	X	X	X	X	X	X	X
SPCC control E-6	E-5							X	X	X	X	X	X	X
SPCC control E-1	E-1							X	X	X	X	X	X	X
Trench drain	TD-3	X	X	X	X	X	X	X	X	X	X	X	X	X
Catch basin CB-3E	CB-3E	X	X	X	X	X	X	X	X	X	X	X	X	X
Catch basin CB-4A	CB-4A	X	X	X	X	X	X	X	X	X	X	X	X	X
Catch basin CB-5A	CB-5A	X	X	X	X	X	X	X	X	X	X	X	X	X
Catch basin CB-6A	CB-6A	X	X	X	X	X	X	X	X	X	X	X	X	X
Dock roof drain	Roof-1							X			X	X		X
Dock roof drain	Roof-2							X			X	X		X
Storm manhole AAT564	AAT564							X	X	X	X	X	X	
Total Samples per Location		7	7	7	7	7	7	14	12	12	14	14	12	13

**Notes:**

<sup>1</sup> = Analysis to include priority pollutant metals (As, Cd, Cr, Cu, Hg, Mn, Ni, Pb, Zn)

<sup>2</sup> = Analysis will include the full suite of analytes

<sup>3</sup> = PCB analysis as Aroclors

<sup>4</sup> = Individual stormwater sampling analytes to be determined according to catch basin solid sampling results

PAH - Polycyclic Aromatic Hydrocarbons

PCBs - Polychlorinated biphenyls

VOCs - Volatile Organic Compounds

Table 5

*Proposed Analytes for Catch Basin Solids Samples  
Stormwater Source Control Evaluation Work Plan  
Univar USA Inc.  
December 2015*

Parameter Group	Constituent	CAS No.	JSCS Screening Level Values <sup>1</sup>		Background <sup>2</sup>	Laboratory Information <sup>3</sup>		
			Toxicity	Bioaccumulation		Analytical Method	Method Reporting Limit	Method Detection Limit
			MacDonald PECs and other SQVs	DEQ 2007 Bioaccumulative Sediment SLVs	DEQ 2013 Oregon Background Metals Concentrations in Soil (Portland Basin)			
			µg/kg	µg/kg	mg/kg		µg/kg	µg/kg
Metals	Arsenic	7440-38-2	7000		8.8	EPA 6020A	500	180
	Cadmium	7440-43-9	4,980	1000	0.63	EPA 6020A	200	19
	Chromium	7440-47-3	111,000		76	EPA 6020A	500	63
	Copper	7440-50-8	149,000		34	EPA 6020A	400	98
	Lead	7439-92-1	128,000	17000	79	EPA 6020A	500	48
	Manganese	7439-96-5	1,100,000		1800	EPA 6020A	1000	170
	Mercury	7439-97-6	1,060	70	0.23	EPA 7471A	20	6
	Nickel	7440-02-0	48,600		47	EPA 6020A	500	81
	Zinc	7440-66-6	459,000		180	EPA 6020A	5000	1120
PCBs Aroclors	Aroclor 1016	12674-11-2	530			EPA 8082A	0.001	0.00005
	Aroclor 1221	11104-28-2				EPA 8082A	0.0011	0.00034
	Aroclor 1232	11141-16-5				EPA 8082A	0.0011	0.00022
	Aroclor 1242	53469-21-9				EPA 8082A	0.001	0.00021
	Aroclor 1248	12672-29-6	1,500			EPA 8082A	0.0011	0.00016
	Aroclor 1254	11097-69-1	300			EPA 8082A	0.001	0.00009
	Aroclor 1260	11096-82-5	200			EPA 8082A	0.001	0.00013
	Aroclor 1262	37324-23-5				EPA 8082A	0.001	0.00019
	Aroclor 1268	11100-14-4				EPA 8082A	0.001	0.00021
Organochlorine Pesticides	Total PCBs	1336-36-3	676	0.39		EPA 8082A	0.0011	0.00034
	Heptachlor	76-44-8	10			EPA 8081A	0.1	0.0039
	Heptachlor epoxide	102-45-73	16			EPA 8081A	0.2	0.0046
	Aldrin	309-00-2	40			EPA 8081A	0.1	0.0118
	alpha-Chlordane	5103-71-9				EPA 8081A	0.1	0.0134
	gamma-Chlordane	5103-74-2				EPA 8081A	0.1	0.0134
	Chlordane (total)	57-74-9	17.6	0.37		EPA 8081A	0.2	0.0268
	Endosulfan alpha-	959-98-8				EPA 8081A	0.1	0.0102
	Endosulfan beta-	33213-65-9				EPA 8081A	0.2	0.0107
	Endosulfan sulfate	1031-07-8				EPA 8081A	0.2	0.0046
	2,4'-DDE	3424-82-6				EPA 8081A	0.2	0.0300
	4,4'-DDE	72-55-9	31.3	0.33		EPA 8081A	0.2	0.0141
	2,4'-DDD	53-19-0				EPA 8081A	0.2	0.0300
	4,4-DDD	72-54-8	28	0.33		EPA 8081A	0.2	0.0074
	2,4'-DDT	789-02-6				EPA 8081A	0.2	0.0161
	4,4-DDT	50-29-3	0.33			EPA 8081A	0.2	0.0152
	Dieldrin	60-57-1	61.8	0.0081		EPA 8081A	0.2	0.0118
	Endrin	72-20-8	207			EPA 8081A	0.2	0.0094
	Endrin aldehyde	7421-93-4				EPA 8081A	0.2	0.0197
	Endrin ketone	53494-70-5				EPA 8081A	0.2	0.0121
	Methoxychlor	72-43-5				EPA 8081A	1	0.0128
	Toxaphene	8001-35-2				EPA 8081A	10	0.779

Table 5

*Proposed Analytes for Catch Basin Solids Samples  
Stormwater Source Control Evaluation Work Plan  
Univar USA Inc.  
December 2015*

Parameter Group	Constituent	CAS No.	JSCS Screening Level Values <sup>1</sup>		Background <sup>2</sup>	Laboratory Information <sup>3</sup>		
			Toxicity	Bioaccumulation		Analytical Method	Method Reporting Limit	Method Detection Limit
			MacDonald PECs and other SQVs	DEQ 2007 Bioaccumulative Sediment SLVs	DEQ 2013 Oregon Background Metals Concentrations in Soil (Portland Basin)			
			µg/kg	µg/kg	mg/kg		µg/kg	µg/kg
Volatile Organic Compounds	1,1,1- Trichloroethane (TCA)	71-55-6				EPA 8260C	2 00	0 300
	1,1- Dichloroethane	75-34-3				EPA 8260C	1 00	0 190
	1,2- Dichloroethane (EDC)	107-06-2				EPA 8260C	1 00	0 150
	cis-1,2-Dichloroethylene	156-59-2				EPA 8260C	2 00	0 300
	Chloroform	67-66-3				EPA 8260C	2 00	0 300
	Methylene chloride	75-09-2				EPA 8260C	15 0	0 240
	Styrene	100-42-5				EPA 8260C	2 00	0 200
	Benzene	71-43-2				EPA 8260C	2 00	0 300
	EthylBenzene	100-41-4				EPA 8260C	2 00	0 400
	m,p-Xylene	179601-23-1				EPA 8260C	2 00	0 200
	o-Xylene	95-47-6				EPA 8260C	2 00	0 260
	Xylenes (total)	1330-20-7				EPA 8260C	4 00	0 460
	Tetrachloroethene (PCE)	127-18-4	500			EPA 8260C	2 00	0 400
	Toluene	108-88-3				EPA 8260C	2 00	0 300
	trans-1,2-Dichloroethene	156-60-5				EPA 8260C	2 00	0 400
Phthalate Esters	Trichloroethene (TCE)	79-01-6	2,100			EPA 8260C	2 00	0 300
	Dimethylphthalate	131-11-3				EPA 8270D	10	0 5
	Diethylphthalate	84-66-2	600			EPA 8270D	20	1 5
	Di-n-butylphthalate	84-74-2	100	60		EPA 8270D	50	5
	Butylbenzylphthalate	85-68-7				EPA 8270D	20	5
	Di-n-octylphthalate	117-84-0				EPA 8270D	50	0 5
Polycyclic Aromatic Hydrocarbons	bis(2-Ethylhexyl)phthalate	117-81-7	800	330		EPA 8270D	60	5
	Naphthalene	91-20-3	561			EPA 8270D	2	0 5
	2-Methylnaphthalene	91-57-6	200			EPA 8270D	2	0 5
	Acenaphthylene	208-96-8	200			EPA 8270D	2	0 5
	Acenaphthene	83-32-9	300			EPA 8270D	2	0 5
	Fluorene	86-73-7	536			EPA 8270D	2	0 5
	Phenanthrene	85-01-8		1,170		EPA 8270D	2	0 5
	Anthracene	120-12-7	845			EPA 8270D	2	0 5
	Fluoranthene	206-44-0	2,230	37000		EPA 8270D	2	0 5
	Pyrene	129-00-0	1,520	1900		EPA 8270D	2	0 5
	Benzo(a)anthracene	56-55-3	1,050			EPA 8270D	2	0 5
	Chrysene	218-01-9	1,290			EPA 8270D	2 5	0 5
	Benzo(b)fluoranthene	205-99-2				EPA 8270D	2	0 5
	Benzo(k)fluoranthene	207-08-9	13,000			EPA 8270D	2 5	0 5
	Benzo(a)pyrene	50-32-8	1,450			EPA 8270D	3	0 5
	Indeno(1,2,3-cd)pyrene	193-39-5	100			EPA 8270D	4	0 5
	Dibenz(a,h)anthracene	53-70-3	1,300			EPA 8270D	4	0 5
	Benzo(g,h,i)perylene	191-24-2	300			EPA 8270D	2 5	0 5

**Notes:**

<sup>1</sup> = Portland Harbor Joint Source Control Strategy, Final, Table 3-1 Revision, July 2007

<sup>2</sup> = Development of Oregon Background Metals Concentrations in Soils Technical Report ODEQ 2013

<sup>3</sup> = Per Test America Laboratories

JSCS - Joint Source Control Strategy

SLVs = Screening level values

SQVs = Sediment quality guidelines

Table 6  
Proposed Analytes for Stormwater Samples  
Stormwater Source Control Evaluation Work Plan  
Univar USA Inc.  
December 2015

Parameter Group	Constituent	CAS No.	JSCS Screening Level Values <sup>1</sup>							Laboratory Information <sup>2</sup>		
			Human Health				Ecological Receptors			Analytical Method	Method Reporting Limit	Method Detection Limit
			Fish Consumption		Drinking Water		EPA's 2004 NRWQC (chronic) <sup>3</sup>	DEQ's 2004 AWQC (chronic) <sup>4</sup>	Oak Ridge National Laboratory's (Tier II SCV)			
			Portland Harbor specific fish consumption rate <sup>5</sup>	Portland Harbor specific fish consumption rate <sup>4</sup>	MCL	Tap Water PRG						
			175 g/day consumption rate	175 g/day consumption rate								
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	
Metals	Arsenic	7440-38-2	0.014	0.014	10	0.045	150	3.1(a)	33,000(2)	EPA 6020_LL	0.2	0.1
	Cadmium	7440-43-9			5	18	0.094	0.38 (14)		EPA 6020_LL	0.1	0.05
	Chromium	7440-47-3			100					EPA 6020_LL	0.5	0.25
	Copper	7440-50-8			1,300 = TT	1,400	2.7	3.6 (14)		EPA 6020_LL	0.5	0.25
	Lead	7439-92-1			15 = TT	15	0.54	0.54 (14)		EPA 6020_LL	0.1	0.05
	Manganese	7439-96-5	10	10	(50)29	1700			120	EPA 6020_LL	0.5	0.25
	Mercury	7439-97-6		0.0146	2	11	0.77	0.012	1.3(b)	EPA 7470A	0.2	0.041
	Nickel	7440-02-0	460	460		730	16	49 (14)		EPA 6020_LL	0.3	0.15
Zinc	7440-66-6	2,600	2,600	(5,000)29	11,000	36	33		EPA 6020_LL	5	2	
PCBs Aroclors	Aroclor 1016	12674-11-2				0.96				EPA 8082A	0.25	0.0085
	Aroclor 1221	11104-28-2				0.034			0.28	EPA 8082A	0.25	0.0145
	Aroclor 1232	11141-16-5				0.034			0.58	EPA 8082A	0.25	0.0075
	Aroclor 1242	53469-21-9				0.034			0.053	EPA 8082A	0.25	0.007
	Aroclor 1248	12672-29-6				0.034			0.081	EPA 8082A	0.25	0.007
	Aroclor 1254	11097-69-1				0.034			0.033	EPA 8082A	0.25	0.0075
	Aroclor 1260	11096-82-5				0.034			94	EPA 8082A	0.25	0.0195
	Aroclor 1262	37324-23-5								EPA 8082A	0.25	0.0065
	Aroclor 1268	11100-14-4								EPA 8082A	0.25	0.007
	Total PCBs	1336-36-3	0.0000064	0.0000064	0.5	0.034	0.014	0.014	0.14	EPA 8082A	0.25	0.0195
Organochlorine Pesticides	Heptachlor	76-44-8	0.0000079	0.0000079	0.4	0.015	0.0038	0.0038	0.0069	EPA 8081A_LL	0.01	0.003
	Heptachlor epoxide	102-45-73	0.0000039	0.0000039	0.2	0.0074	0.0038	0.0038		EPA 8081A_LL	0.005	0.0025
	Aldrin	309-00-2	0.000005	0.000005		0.004				EPA 8081A_LL	0.005	0.0015
	Chlordane	57-74-9	0.000081	0.000081	2	0.19	0.0043	0.0043		EPA 8081A_LL	0.100	0.080
	Endosulfan alpha-	959-98-8	8.9	8.9		220	0.056	0.056	0.051	EPA 8081A_LL	0.005	0.003
	Endosulfan beta-	33213-65-9	8.9	8.9		220	0.056	0.056	0.051	EPA 8081A_LL	0.005	0.002
	Endosulfan sulfate	1031-07-8	8.9	8.9						EPA 8081A_LL	0.010	0.003
	2,4'-DDE	3424-82-6								EPA 8081A_LL	0.100	0.020
	4,4'-DDE	72-55-9	0.000022	0.000022		0.2				EPA 8081A_LL	0.005	0.003
	2,4'-DDD	53-19-0								EPA 8081A_LL	0.100	0.020
	4,4'-DDD	72-54-8	0.000031	0.000031		0.28			0.011(d)	EPA 8081A_LL	0.005	0.004
	2,4'-DDT	789-02-6								EPA 8081A_LL	0.100	0.020
	4,4'-DDT	50-29-3	0.000022	0.000022		0.2	0.001 0.001	0.013(e)	62.9(2)	EPA 8081A_LL	0.010	0.004
	Dieldrin	60-57-1	0.0000054	0.0000054		0.0042	0.056	0.0019(14)		EPA 8081A_LL	0.005	0.002
	Endrin	72-20-8	0.006	0.006	2	11	0.036	0.0023 (14)	0.061	EPA 8081A_LL	0.005	0.002
	Endrin aldehyde	7421-93-4	0.03	0.03						EPA 8081A_LL	0.010	0.002
	Endrin ketone	53494-70-5								EPA 8081A_LL	0.010	0.007
	Methoxychlor	72-43-5			40	180	0.03	0.03	0.019	EPA 8081A_LL	0.005	0.0035
	Toxaphene	8001-35-2	0.000028	0.000028	3	0.061	0.0002	0.0002		EPA 8081A_LL	0.5	0.25
	Volatile Organic Compounds	1,1,1-Trichloroethane (TCA)	71-55-6			200	840			11	EPA 8260C_LL	0.200
1,1-Dichloroethane		75-34-3				1200			47	EPA 8260C_LL	0.200	0.025
1,2-Dichloroethane (EDC)		107-06-2	3.7	3.7	5	0.73		20,000 (16)	910	EPA 8260C_LL	0.200	0.025
cis-1,2-Dichloroethylene		156-59-2			70	61				EPA 8260C_LL	0.200	0.025
Chloroform		67-66-3	47	47		0.17		1,240 (16)	28	EPA 8260C_LL	0.200	0.030
Methylene chloride		75-09-2	59	59		8.9			2,200	EPA 8260C_LL	0.500	0.110
Styrene		100-42-5			100	1,600				EPA 8260C_LL	0.500	0.100
Benzene		71-43-2	5.1	5.1	5	1.2			130	EPA 8260C_LL	0.200	0.025
EthylBenzene		100-41-4	210	210	700	1,300		7.3		EPA 8260C_LL	0.200	0.030
m,p-Xylene		179601-23-1						1.8(f)		EPA 8260C_LL	0.500	0.050
o-Xylene		95-47-6				1400			13(g)	EPA 8260C_LL	0.500	0.060
Xylenes (total)		1330-20-7			10,000	200				EPA 8260C_LL	1.000	0.110
Tetrachloroethene (PCE)		127-18-4	0.33	0.33	5	0.12		840 (16)	98	EPA 8260C_LL	0.500	0.070
Toluene		108-88-3	1,500	1,500	1,000	2300			9.8	EPA 8260C_LL	0.200	0.025
trans-1,2-Dichloroethene		156-60-5	1,000	1,000	100	110			590	EPA 8260C_LL	0.200	0.025
Trichloroethene (TCE)		79-01-6	3	3	5	0.17		21,900 (16)	47	EPA 8260C_LL	0.200	0.025
Vinyl Chloride		75-01-4	0.24	0.24	2	0.015				EPA 8260C_LL	0.020	0.013

**Table 6**  
**Proposed Analytes for Stormwater Samples**  
**Stormwater Source Control Evaluation Work Plan**  
**Univar USA Inc.**  
**December 2015**

Parameter Group	Constituent	CAS No.	JSCS Screening Level Values <sup>1</sup>							Laboratory Information <sup>2</sup>			
			Human Health				Ecological Receptors			Analytical Method	Method Reporting Limit	Method Detection Limit	
			Fish Consumption		Drinking Water		EPA's 2004 NRWQC (chronic) <sup>3</sup>	DEQ's 2004 AWQC (chronic) <sup>4</sup>	Oak Ridge National Laboratory's (Tier				
			Portland Harbor specific fish consumption rate <sup>3</sup>	Portland Harbor specific fish consumption rate <sup>4</sup>	MCL	Tap Water PRG							
Phthalate Esters	Dimethylphthalate	131-11-3	110,000	110,000		370,000		3 (16)		210	EPA 8270D	0 400	0 100
	Diethylphthalate	84-66-2	4,400	4,400		29,000		3 (16)			EPA 8270D	0 400	0 100
	Di-n-butylphthalate	84-74-2	450	450		3,700		3 (16)			EPA 8270D	0 400	0 130
	Butylbenzylphthalate	85-68-7	190	190		7,300		3 (16)		19	EPA 8270D	0 600	0 200
	Di-n-octylphthalate	117-84-0				1,500		3 (16)			EPA 8270D	0 400	0 180
	bis(2-Ethylhexyl)phthalate	117-81-7	0 22	0 22	6	4 8		3 (16)			EPA 8270D	3 00	1 18
Polycyclic Aromatic Hydrocarbons	Naphthalene	91-20-3			0 2 (26)	6 2		620 (16)		12	EPA 8270D	0 400	0 100
	2-Methylnaphthalene	91-57-6			0 2 (26)					2 1(h)	EPA 8270D	0 200	0 020
	Acenaphthylene	208-96-8			0 2 (26)						EPA 8270D	0 080	0 020
	Acenaphthene	83-32-9	99	99	0 2 (26)	370		520 (16)			EPA 8270D	0 100	0 020
	Fluorene	86-73-7	530	530	0 2 (26)	240				3 9	EPA 8270D	0 060	0 020
	Phenanthrene	85-01-8				0 2 (26)					EPA 8270D	0 080	0 020
	Anthracene	120-12-7	4,000	4,000	0 2 (26)	1,800				0 73	EPA 8270D	0 040	0 010
	Fluoranthene	206-44-0	14	14	0 2 (26)	1,500					EPA 8270D	0 050	0 013
	Pyrene	129-00-0	400	400	0 2 (26)	180					EPA 8270D	0 060	0 013
	Benzo(a)anthracene	56-55-3	0 0018	0 0018	0 2 (26)	0 092				0 027	EPA 8270D_SIM	0 0200	0 00600
	Chrysene	218-01-9	0 0018	0 0018	0 2 (26)	9 2					EPA 8270D_SIM	0 0200	0 00600
	Benzo(b)fluoranthene	205-99-2	0 0018	0 0018	0 2 (26)	0 092					EPA 8270D_SIM	0 0200	0 00600
	Benzo(k)fluoranthene	207-08-9	0 0018	0 0018	0 2 (26)	0 92					EPA 8270D_SIM	0 0200	0 00300
	Benzo(a)pyrene	50-32-8	0 0018	0 0018	0 2	0 0092				0 014	EPA 8270D_SIM	0 0200	0 00600
	Indeno(1,2,3-cd)pyrene	193-39-5	0 0018	0 0018	0 2 (26)	0 092					EPA 8270D_SIM	0 0200	0 00600
	Dibenz(a,h)anthracene	53-70-3	0 0018	0 0018	0 2 (26)	0 0092					EPA 8270D_SIM	0 0200	0 00600
	Benzo(g,h,i)perylene	191-24-2			0 2 (26)						EPA 8270D_SIM	0 0200	0 00600
General Chemistry	pH										EPA 9040		
	Total Suspended Solids										EPA 2540D	2000	2000

**Notes:**

- <sup>1</sup> - Portland Harbor Joint Source Control Strategy, Final, Table 3-1 Revision, July 2007  
<sup>2</sup> - Per Test America Laboratories  
JSCS - Joint Source Control Strategy  
<sup>3</sup> - Metals are expressed as dissolved metal in the water column  
<sup>4</sup> - Metals are expressed as total recoverable metal in the water column

PAHs - Polycyclic Aromatic Hydrocarbons  
DEQ - Department of Environmental Quality  
NRWQC - National Recommended Water Quality Criteria  
AWQC - Ambient Water Quality Criteria

MCL - Maximum Contaminant Limit  
PRG - Preliminary Remediation Goal  
EPA - Environmental Protection Agency  
SCV - Secondary Chronic Value

## *Appendices*

*Appendix A*  
*Historical Stormwater Sampling*  
*Results*



**Univar USA**  
3950 NW Yeon Ave

## NPDES STORMWATER MONITORING DATA

Org ID: 3602

Location Code: 01

Description: *STMH AT REAR OF FACILITY.*

Permit Year	Sample Date	Tester	Copper	Lead	Zinc	O/G	TSS	pH	Phos - Total	BOD - 5	E. coli	COD
09-10	3/12/2010	self	0.019	0.022	0.339	6.7	89.5	6.03				
09-10	11/9/2009	self	0.0062	0.01	0.088	< 5	7.5	7.31				
08-09	4/1/2009	self	0.0089	< 0.01	0.151	< 5	29	7.33				
08-09	11/12/2008	self	< 0.01	0.0027	0.099	< 5	8	7.67				
07-08	2/5/2008	self	0.017	0.013	0.249	6.9	49	7.54				
07-08	11/16/2007	self	0.084	0.0057	0.541	< 5	19	5.79				
06-07	3/2/2007	self	< 0.01	0.00823	< 0.164	< 5	16	5.8				
06-07	11/21/2006	self	< 0.01	0.0058	0.158	< 5	34	7.15				
05-06	3/8/2006	self	0.014	0.0092	0.327	< 5	24	7.2				
05-06	12/21/2005	self	0.0107	0.0064	0.159	< 5	19	7.87				
04-05	4/1/2005	self	0.0131	0.0078	0.202	< 5	29	6.1				
04-05	1/28/2005	self	0.0133	0.0049	0.237	< 5	20	7.12				
03-04	5/27/2004	self	0.0228	0.0228	0.259	< 5	72					
03-04	2/17/2004	self	0.012	0.0095	0.114	< 5	37					
02-03	3/12/2003	self	0.0158	0.0097	0.117	< 5	37	8.59				
02-03	12/30/2002	self	0.0108	0.0098	0.181	< 5	200	8.5				
01-02	6/18/2002	self	0.0128	0.0082	0.165	12	5					
01-02	12/12/2001	self	< 0.01	0.005	0.093	< 5	109	7.09				
01-02	11/30/2001	city	< 0.05	< 0.2	0.1	< 5	22	8.1				
00-01	3/27/2001	self	0.01	0.008	0.089	< 5	74	7.24				
00-01	1/9/2001	self	0.023	0.015	0.166	< 5	100	7.17				

Revised: 10/11/2012

Univar USA

Stormwater Monitoring Report

Page 1 of 3

*This report is intended for internal use. The City of Portland makes no warranty, expressed or implied, as to the completeness or accuracy of the information published. For compliance or reporting purposes, the user should refer to the actual laboratory reports.*

Location Code: 01 Description: STMH AT REAR OF FACILITY.

Permit Year	Sample Date	Tester	Copper	Lead	Zinc	O/G	TSS	pH	Phos - Total	BOD - 5	E. coli	COD
99-00	1/11/2000	self	< 0.01	0.004	0.101	< 5	25	6.88				

Location Code: 02 Description: CATCH BASIN EAST & SOUTH SIDE OF FACILITY~due east of drum storage.

Permit Year	Sample Date	Tester	Copper	Lead	Zinc	O/G	TSS	pH	Phos - Total	BOD - 5	E. coli	COD
09-10	3/12/2010	self	0.0125	0.0134	0.123	< 5	107	5.74				
09-10	11/9/2009	self	0.0189	0.0147	0.176	9.3	93	7.79				
08-09	4/1/2009	self	0.0455	0.0812	0.595	19	354	7.84				
08-09	11/12/2008	self	< 0.01	0.0075	0.088	< 5	64	7.62				
07-08	2/5/2008	self	< 0.01	0.0108	0.129	5.8	65	4.9				
07-08	11/16/2007	self	< 0.01	0.0084	0.0754	< 5	78	5.23				
06-07	3/2/2007	self	0.0146	0.018	0.16	5.3	244	6.1				
06-07	11/21/2006	self		0.0483	0.381	7.9	244	6.9				
05-06	3/8/2006	self	0.018	0.017	0.151	5.2	105	8.1				
05-06	3/2/2006	self	0.0146	0.018	0.16	5.3		6.1				
05-06	12/21/2005	self	0.01	0.008	0.0724	< 5	52	8.12				
04-05	4/1/2005	self	0.0343	0.0263	0.308	7.7	295	6.4				
04-05	1/28/2005	self	0.0203	0.0242	0.34	9.9	372	7.37				
03-04	5/27/2004	self	0.0648	0.109	0.546	12	462					
03-04	2/17/2004	self	0.0159	0.0159	0.137	< 5	464					
02-03	3/12/2003	self	0.0157	0.0153	0.13	< 5	120	8.07				
02-03	12/30/2002	self	0.0334	0.0447	0.399	5.3	42	9.6				
01-02	6/18/2002	self	0.0242	0.0071	0.178	11	33					
01-02	12/12/2001	self	0.022	0.019	0.214	< 5	83	7.09				
01-02	11/30/2001	city	< 0.05	< 0.2	0.075	< 5	268	6.3				
00-01	3/27/2001	self	0.01	0.0092	0.067	< 5	52	6.61				
00-01	1/9/2001	self	0.016	0.007	0.128	< 5	22	7				

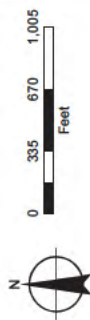
Location Code: 03 Description: STMH ON EASTSIDE OF FACILITY. PAINTED RED.

Permit Year	Sample Date	Tester	Copper	Lead	Zinc	O/G	TSS	pH	Phos - Total	BOD - 5	E. coli	COD
09-10	3/12/2010	self	0.0267	0.0202	0.187	< 5	19.5	6.14				
09-10	11/9/2009	self	0.011	0.01	0.127	< 5	14	7.54				
08-09	4/1/2009	self	0.0142	0.0157	0.151	< 5	393	7.55				
08-09	11/12/2008	self	< 0.01	0.0026	0.057	< 5	16	7.42				
07-08	2/5/2008	self	0.048	0.0466	0.366	< 5	8	5.96				
07-08	11/16/2007	self	< 0.01	0.0032	0.0689	< 5	370	6.24				
06-07	3/2/2007	self	< 0.01	0.00376	0.0557	< 5	18	6.1				
06-07	11/21/2006	self	< 0.01	< 0.002	0.0549	< 5	7	6.52				
05-06	3/8/2006	self	0.014	0.0077	0.169	< 5	14	7.98				
05-06	12/21/2005	self	0.0141	0.0076	0.0965	< 5	13	8.19				
04-05	4/1/2005	self	0.0195	0.0143	0.182	< 5	23	6.37				
04-05	1/28/2005	self	0.0453	0.0297	0.3	< 5	144	7.42				
03-04	5/27/2004	self	0.108	0.141	0.824	11	1420					
03-04	2/17/2004	self	0.0536	0.0693	0.408	12	156					
02-03	3/12/2003	self	0.0515	0.0308	0.274	10	514	7.8				
02-03	12/30/2002	self	0.0533	0.0384	0.335	< 5	492	8.1				
01-02	6/18/2002	self	0.0134	0.0082	0.243	11	50					
01-02	12/12/2001	self	0.023	0.009	0.208	< 5	19	7.19				
00-01	3/27/2001	self	0.013	0.0034	0.073	5	8	9.24				
00-01	1/1/2001	self	0.012	0.004	0.105	< 5	7	7.21				

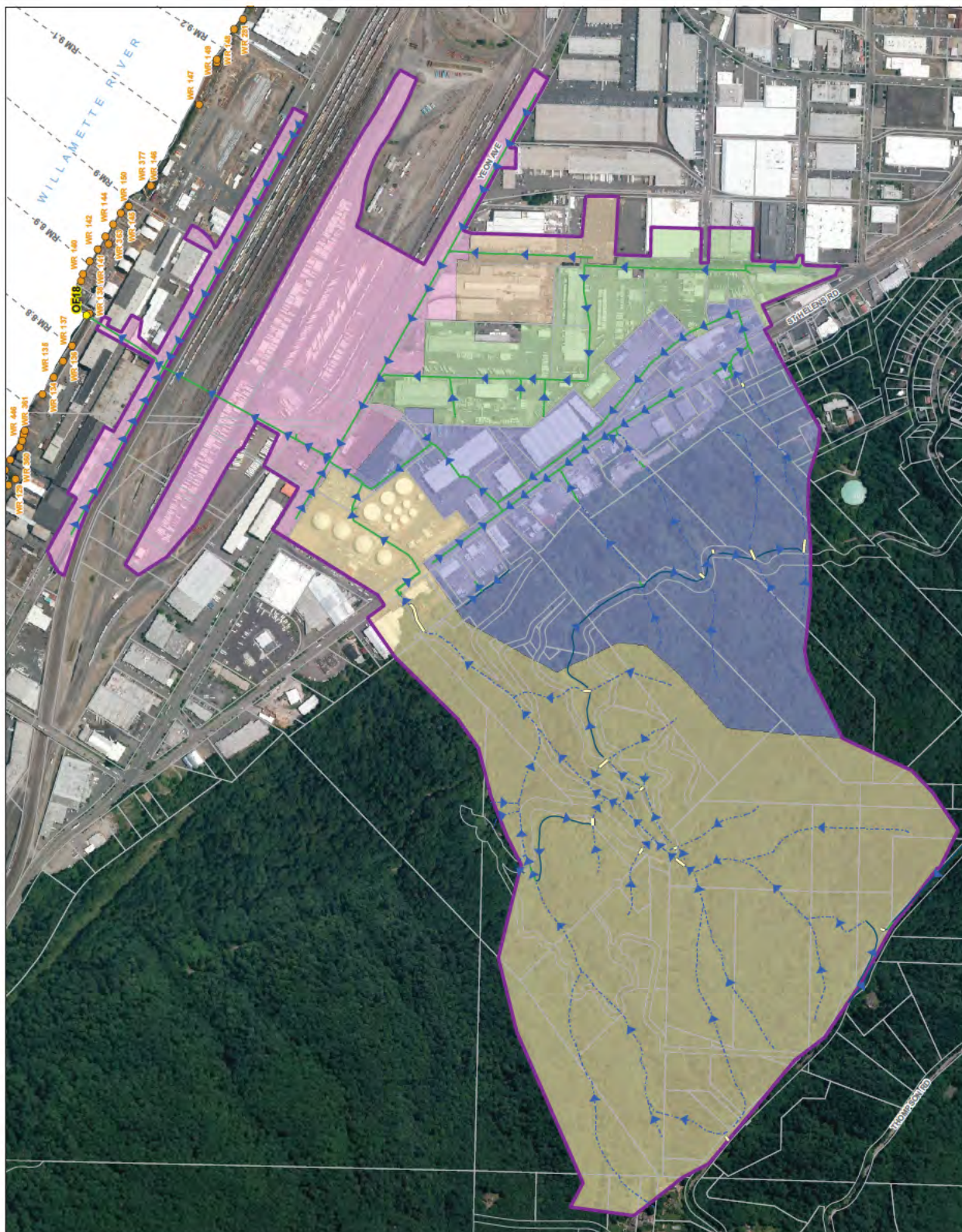
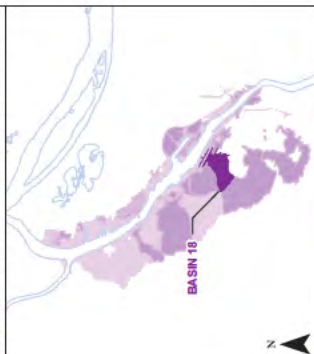
*Appendix B*  
*COP Drainage Basin 18 Figures*

**FIGURE 1**  
**Basin 18**  
**Drainage Basin Overview**

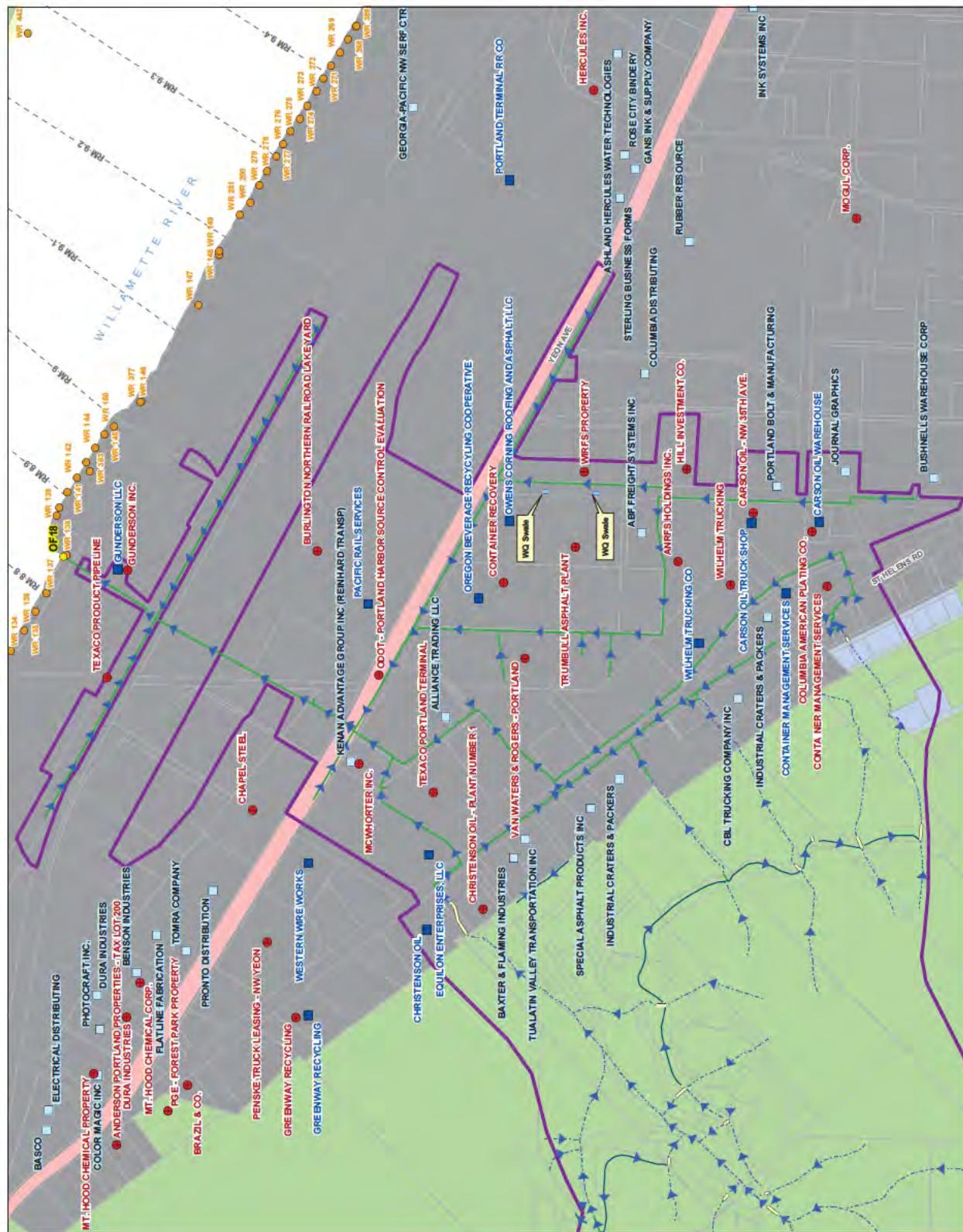
- Basin 18
- Basin 18 Subbasins
- Western Subbasin
- West-Central Subbasin
- East-Central Subbasin
- Eastern Subbasin
- Downstream Subbasin
- Conveyance System
- Storm Line
- Culvert
- Ditch
- Channel
- City Outfall
- Non-City Outfall
- All Other Data
- River Mile (RM)
- Tax Lot
- Discharges to City Outfall
- Portland Harbor Hydroboundary



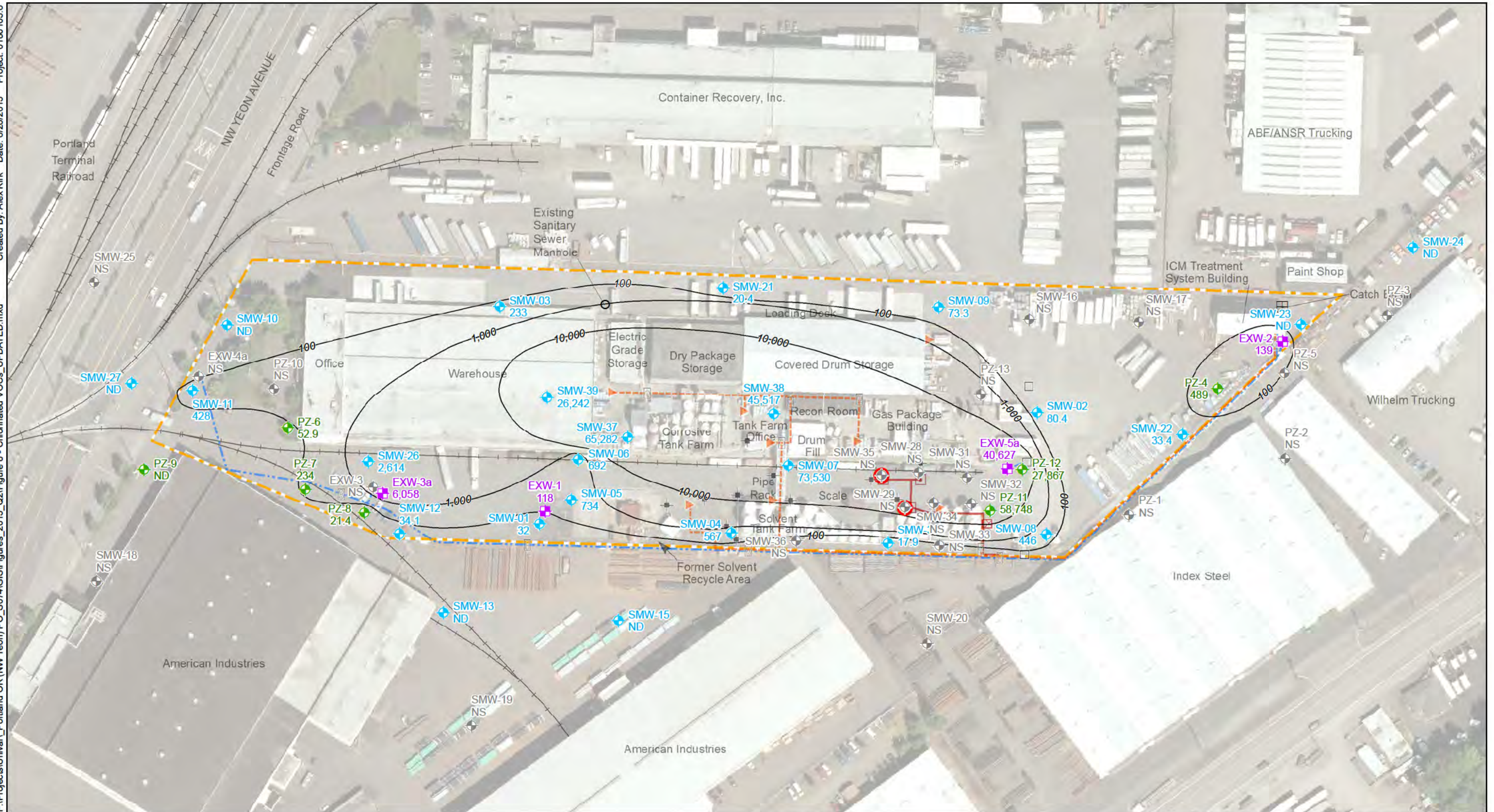
**MAP NOTES:**  
Date: December 31, 2013  
Data Sources: BE&S, NE TPO,  
Portland Oregon, 97204, 9712  
Aerial Photo Taken 2012



**FIGURE 2**  
Basin 18  
Industrial Area Overview and Conveyance  
System Source Controls

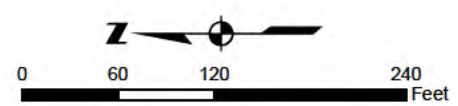


*Appendix C*  
*Shallow Groundwater*  
*Isoconcentration Contour Maps*



Legend

- |   |                                      |                        |                              |
|---|--------------------------------------|------------------------|------------------------------|
| Shallow Zone Monitoring Well                  | cVOC Isocontours                     | SVE Well               | Pipe Junction Vault          |
| Piezometer                                    | Railroad Track                       | LNAPL Pilot Test Well  | LNAPL Pilot Test Piping      |
| Extraction Well                               | Approximate Univar Property Boundary | Vapor Monitoring Probe | Groundwater Pipe             |
| Not Sampled                                   |                                      | SVE Condensate Sump    | SVE Pipe                     |
| LNAPL observed during reporting period (2Q13) |                                      | Pipe Cleanout Vault    | LNAPL Recovery Equipment Pad |

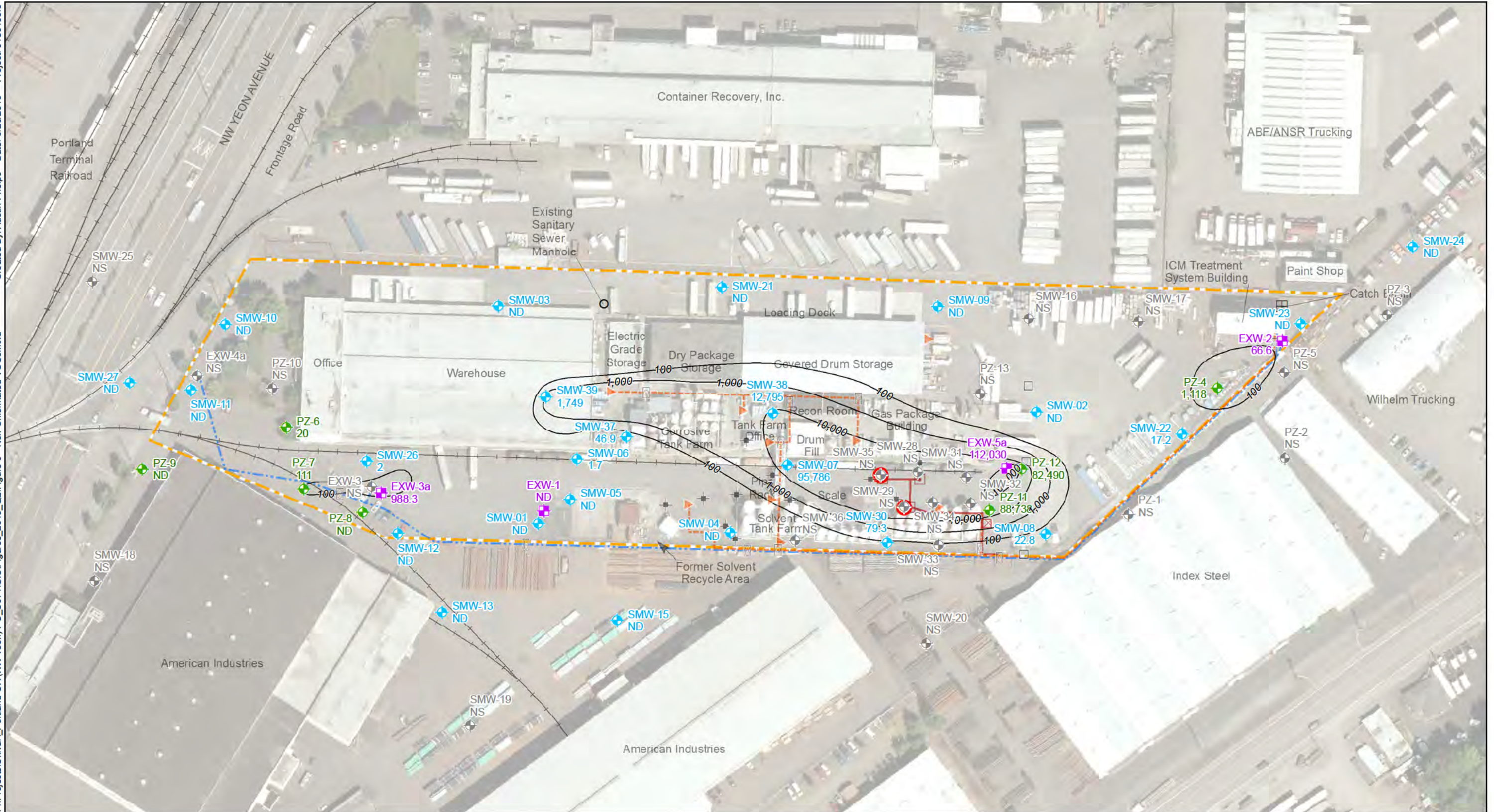


Aerial Image - USGS State Orthoimagery, July 2010, 0.5 ft per pixel

Note

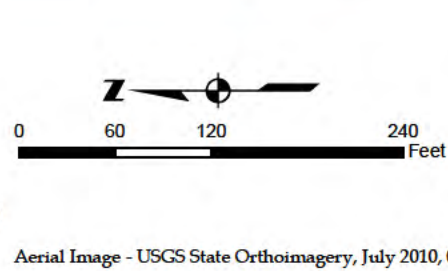
- cVOC Chlorinated volatile organic compounds
- Values shown are the combined concentrations for cVOCs, as designated and summed in Table 4
- Only detected VOCs are summed
- All values given in micrograms per liter (ug/L)
- ND = Not detected above laboratory method reporting limit (MRL)
- NS = Not sampled

**Figure C1**  
*Total cVOC Concentrations in Shallow Groundwater - May 2015*  
**Univar USA Inc., NW Yeon Ave**  
**Portland, Oregon**



Legend

- |   |                                      |                        |                              |
|---|--------------------------------------|------------------------|------------------------------|
| Shallow Zone Monitoring Well                  | Non-cVOC Isocontours                 | SVE Well               | Pipe Junction Vault          |
| Piezometer                                    | Railroad Track                       | LNAPL Pilot Test Well  | LNAPL Pilot Test Piping      |
| Extraction Well                               | Approximate Univar Property Boundary | Vapor Monitoring Probe | Groundwater Pipe             |
| Not Sampled                                   |                                      | SVE Condensate Sump    | SVE Pipe                     |
| LNAPL observed during reporting period (2Q13) |                                      | Pipe Cleanout Vault    | LNAPL Recovery Equipment Pad |



**Figure C2**  
*Total Non-cVOC Concentrations in Shallow Groundwater - May 2015*  
Univar USA Inc., NW Yeon Ave  
Portland, Oregon

Environmental Resources Management  
1001 SW 5th St, Suite 1010  
Portland, Oregon 97204

*Appendix D*  
*Catch Basin Solids Sampling*  
*Standard Operating Procedure*

---

# Standard Operating Procedures

## Guidance for Sampling of Catch Basin Solids

Prepared for  
**City of Portland**

July 2003

Prepared by  
**CH2MHILL**



**Printed on  
Recycled and  
Recyclable  
Paper**

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# Standard Operating Procedures—Guidance for Sampling of Catch Basin Solids

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## 1.0 Purpose

This document describes Standard Operating Procedures (SOPs) for the collection of environmental solids samples from stormwater catch basins. It provides procedures to be used for assessing potential pathways of contamination from upland sources via stormwater conveyances to receiving waters and sediments. Sampling for environmental investigations requires different methods than those that may be used for determining waste profiles for catch basin solids disposal.

The procedures described here are intended to provide representative samples of catch basin contents. These procedures may be modified for other purposes, such as assessing characteristics of older or newer solids, or because of space or access limitations. All deviations from these SOPs should be noted in field logs and reports.

## 1.1 Background

Catch basins are typically designed to prevent debris, gravels, and soils from fouling storm drain lines, and generally remove larger particles (greater than approximately 1 millimeter in diameter). Unlike specially designed stormwater treatment vaults, catch basins are not intended to remove fine particles or soluble pollutants, and they may only marginally reduce concentrations of contaminants or suspended solids. Catch basin retention efficiencies for suspended solids may be highly variable as functions of basin design, stormwater flow rates, accumulated solids in the sump (a function of cleaning frequency), and solids particle characteristics. Finer particle fractions may be suspended in moving water and carried beyond the catch basin. Because these finer particles are often correlated with organic and inorganic contaminants, special care needs to be taken while collecting catch basin solids samples to ensure that the finer particle fraction is sampled.

## 2.0 Scope and Applicability

The methodologies discussed in these SOPs are intended to provide procedures for collecting representative environmental samples of solids in stormwater catch basins. These SOPs describe specific steps that can be used to ensure representative and comparable data.

Residual material in catch basins is inherently variable. Factors that can affect variability include the characteristics of catch basin structures, the sources of particles, water flow rates and stormwater quality, and the depth and pattern of accumulated solids. In addition, the characteristics of catch basin solids can vary from slurry-like to dry solids. Although variability may be unavoidable, standard methods of collecting and handling samples can improve data quality.

## 3.0 Equipment and Materials

The following equipment should be available for collecting solids samples from catch basins:

- Sampler (generally one type will be selected per catch basin)
  - Stainless steel scoop, trowel, or spoon
  - Bucket (hand) auger
  - Hand corer
  - Petite Ponar® dredge/Van Veen® dredge (0.025 square meter [m<sup>2</sup>])
- Sampling Equipment List
  - Site Sampling and Analysis Plan and/or site files detailing sampling locations, sample collection, and site information
  - Large stainless steel bowl
  - Stainless steel mixing spoon
  - Latex gloves
  - Metal or wooden rod
  - Field data sheets or other documentation
  - Laboratory-supplied sample containers
  - Cooler and ice/chilled blue ice
  - Tape measure
  - Ziploc® bags
  - Field notebook
  - Permanent marking pens
  - Sample labels
  - Chain-of-custody seals
  - Personal Protective Equipment (PPE)

## 4.0 Procedures

### 4.1 Documentation

Regardless of the equipment to be used, the following general procedures apply:

- Confirm any active catch basin best management practices such as sweeping and cleaning, frequency of activity, etc., if known.
- Document design flow rates (base flow, storm flow) for catch basins, if known.
- Record weather conditions at the time of sampling and last known rainfall event(s).
- Record the location of the catch basin. Include potential solids or contaminant sources such as construction activities, erosion, equipment storage or use, waste or material storage, vehicles, exhaust vents, onsite processes, etc. Site features, distances, flow directions, and gradients should be noted or sketched on a site map.

- Record dimensions of catch basin. Diagram inlet/outlet pipes in the catch basin. The source of inlet flows and destination of outlet flows should be noted, if known.
- Note the presence of water, visible flows, signs of flooding, clogging, debris in or around the catch basin, blocked inlets/outlets, staining, etc.
- Note any apparent evidence of contamination in the catch basin, such as odor, sheen, discoloration, etc., of water or solids.
- Measure the depth of solids in the catch basin and the total depth of the catch basin or sump. Use a decontaminated metal rod or disposable wooden dowel to probe the total depth of the catch basin.
- When recovering samples, record visual observations of:
  - Color
  - Texture, estimates of particle size fractions (as soil classification)
  - Amount and type of debris (Note: any large debris observed in the sample, including sticks, leaves, beverage containers, miscellaneous pieces of plastic and metal, stones and gravel, etc., should be removed, but paint chips and small organic matter should be left in the sample)
- Prepare a diagram of sampling locations within the catch basin, noting any special features such as sumps, inlets and outlets, etc.
- Decontaminate all sampling equipment using documented procedures before and after any sampling activities. Record the decontamination procedures in the field notes.
- Record any deviations from the specified sampling procedures or any obstacles encountered.
- Complete a chain-of-custody form for all samples.

## **4.2 Selection of Sampling Method**

Sampling equipment should be matched with the presence and depth of water, solids water content, and catch basin depth. Figure 1 presents a flow chart for determining the appropriate sampling device. Detailed descriptions of each sampling method are presented in Section 4.3.

### **4.2.1 Decontamination of Equipment**

Non-disposable equipment that contacts solids samples should be thoroughly cleaned and decontaminated before each set of samples is collected. Decontamination should be done in accordance with City of Portland SOP 7.01a<sup>1</sup> or comparable standard. Decontamination solutions should be selected on the basis of the type of analysis being conducted on samples.

---

<sup>1</sup> Bureau of Environmental Services, Environmental Investigations Division, SOP No. 7.01a Draft or subsequent revisions, Decontamination of Sampling Equipment.

## 4.3 Sample Collection

This guidance for sampling catch basins is intended to assess individual catch basins as potential sources of past, present, or future conduits of contamination to Willamette River sediments. Sample collection should therefore incorporate material representative of the total depth and area unless specific alternative sampling objectives are otherwise noted and approved. In some cases, sample collection from discrete depths may be desired based on knowledge of catch basin maintenance and time since last cleaning, activities conducted within the drainage area, spills or releases, and related information.

Standing water in the catch basin, if present, may be pumped off to simplify sample collection. If this procedure is conducted, care must be taken to:

- Pump water from the surface only
- Leave a thin layer of water so that fine materials in the solids are not disturbed
- Pump water slowly so that fine materials are not disturbed
- Dispose of pumped water in the sanitary sewer (pumped water may not be released into the storm system)
- Document all steps taken, the depth and volume of water removed, the point of water disposal, water remaining before sampling, and other relevant factors

### 4.3.1 Sampling Firm Solids in Catch Basins Without Standing Water

Firm solids above the water line are most easily collected using simple soil sampling tools (that is, stainless steel spoon or trowel, or bucket auger). When sampling with a spoon or auger, solids may be moist or wet but should retain their form and structure when handled. (Note: If the sample has a high water content [water drips from solids], another sampling method should be considered to minimize the loss of fine particles in liquid drainage.)

#### 4.3.1.1 Stainless Steel Spoon, Scoop, or Trowel

If necessary, the spoon, scoop, or trowel may be attached to an extension pole in order to reach the bottom of the catch basin, provided a representative sample can be retained on the spoon and recovered intact.

The following procedure defines steps to be taken when sampling dry or moist solids with a stainless steel spoon, scoop, or trowel:

1. Collect the necessary equipment. Clean and decontaminate the equipment, using procedures appropriate for the analytical parameters to be measured.
2. Arrange the appropriate sampling containers.
3. Don a new pair of nitrile or latex gloves.
4. Using a decontaminated stainless steel spoon, scoop, or trowel, collect an equal amount of material from five locations: each corner (or, if round, each compass point) and the center. Material recovered at each point should be a composite of the total depth of accumulated material, unless otherwise specified in the sampling plan.

5. Place sampled solids into a decontaminated stainless steel bowl or tray. Repeat step 4 as necessary in order to obtain the required volume, and mix to homogenize thoroughly using a decontaminated or disposable stainless steel spoon.
6. Collect a suitable portion of the mixed solids with a decontaminated or disposable stainless steel spoon and place into each appropriate sample container.
7. Check that a Teflon® liner is present in caps, if required. Secure the caps tightly. Label sample containers clearly with all appropriate sample information.
8. Place samples in cooler for transport. Refrigeration to 4° Celsius (C) is usually required. Transport time to the laboratory should be as short as possible and must be documented with a chain-of-custody form.
9. Ensure that appropriate field notes, as detailed in the Field Documentation, Section 4.1, have been collected.
10. Complete the chain-of-custody documents.

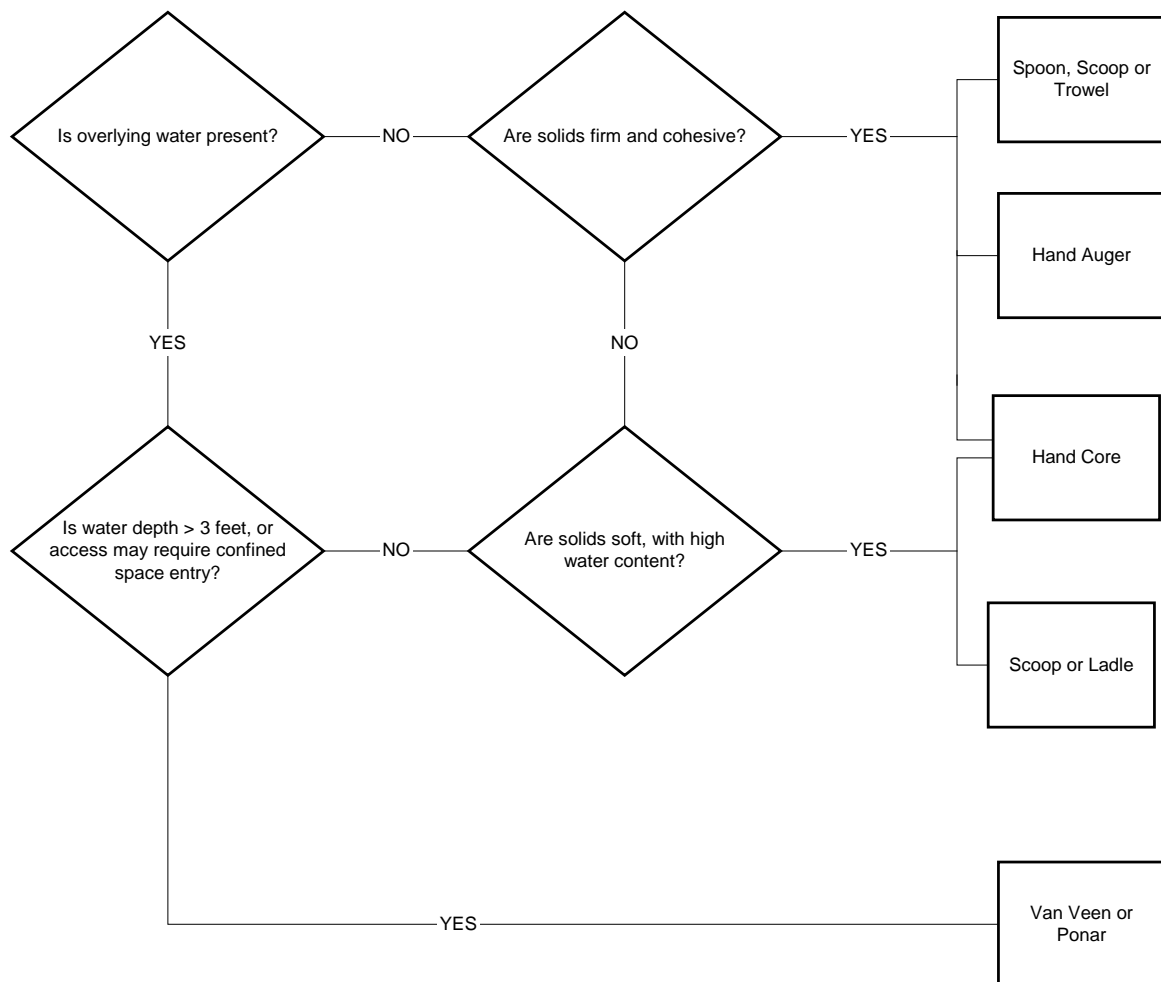
#### **4.3.1.2 Stainless Steel Bucket Auger (Hand Auger)**

Bucket augers are applicable to the same situations and materials as the spoon, scoop, and trowel method described above. Most bucket augers have long handles (> 4 feet), and some can be fitted with extension handles that will allow the collection of solids from deeper catch basins.

The following procedure defines steps to be taken when sampling dry or moist solids with a stainless steel bucket auger:

1. Collect the necessary equipment. Clean and decontaminate the equipment, using procedures appropriate for the analytical parameters to be measured.
2. Arrange the appropriate sampling containers.
3. Don a new pair of nitrile or latex gloves.
4. Advance a thoroughly cleaned and decontaminated bucket auger into catch basin solids in each corner (or, if round, each compass point) and the center of the catch basin. Material recovered at each point should be a composite of the total depth of accumulated material, unless otherwise specified in the sampling plan.
5. Empty the auger into a stainless steel bowl or tray. Repeat step 4 as necessary in order to obtain the required volume and mix to homogenize thoroughly, using a decontaminated or disposable stainless steel spoon.
6. Collect a suitable portion of the mixed solids with a decontaminated or disposable stainless steel spoon and place the sample into each appropriate sample container.

**Figure 1. Flow Chart for Selecting the Appropriate Catch Basin Solids Sampler**



7. Check that a Teflon® liner is present in caps, if required. Secure the caps tightly. Label sample containers clearly with all appropriate sample information.
8. Place samples in cooler for transport. Refrigeration to 4° Celsius (C) is usually required. Transport time to the laboratory should be as short as possible and must be documented with a chain-of-custody form.
9. Ensure that appropriate field notes, as detailed in the Field Documentation, Section 4.1, have been collected.
10. Complete the chain-of-custody documents.

### **4.3.2 Sampling Solids in Catch Basins with Standing Water**

Hand corers or dredge samplers should be used when standing water is present in catch basins to prevent washout of sample material when the sampler is retrieved through the water column. Corers may also be used for dry and moist solids. Some hand corers can be fitted with extension handles that will allow the collection of samples in deeper basins.

#### **4.3.2.1 Hand Corers**

The following procedure defines steps to be taken when sampling saturated solids with a stainless steel hand corer:

1. Collect the necessary equipment. Clean and decontaminate the equipment, using procedures appropriate for the analytical parameters to be measured.
2. Arrange the appropriate sampling containers.
3. Don a new pair of nitrile or latex gloves.
4. Using a thoroughly cleaned and decontaminated corer, advance the sampler into catch basin solids with a smooth, continuous motion, twist corer, and then withdraw it in a single motion.
5. Remove the nosepiece and withdraw the sample into a stainless steel bowl or tray.
6. Repeat steps 4 and 5 in each corner (or, if round, each compass point) and the center of the catch basin. Material recovered at each point should be a composite of the total depth of accumulated material, unless otherwise specified in the sampling plan.
7. Mix to homogenize thoroughly, using a decontaminated or disposable stainless steel spoon.
8. Collect a suitable portion of the mixed solids with the decontaminated or disposable stainless steel spoon and place into each appropriate sample container.
9. Check that a Teflon® liner is present in caps, if required. Secure the caps tightly. Label sample containers clearly with all appropriate sample information.
10. Place samples in cooler for transport. Refrigeration to 4° Celsius (C) is usually required. Transport time to the laboratory should be as short as possible and must be documented with a chain-of-custody form.

11. Ensure that appropriate field notes, as detailed in the Field Documentation, Section 4.1, have been collected.
12. Complete the chain-of-custody documents.

#### **4.3.2.2 Clamshell-Type Dredge Samplers**

Clamshell-type dredge samplers like the Petite Ponar® and Van Veen® 0.025-m<sup>2</sup> dredge sampler are capable of sampling moist and wet solids, including those below standing water. However, penetration depths usually will not exceed several inches, so it may not be possible to collect a representative sample if the solids layer is greater than several inches. The sampling action of these devices causes agitation currents that may temporarily resuspend some settled solids. This disturbance can be minimized by lowering the sampler slowly and by allowing slow contact with the solids.

Samples collected with clamshell-type dredge samplers should meet the following acceptability criteria in order to ensure that representative samples have been collected (EPA, 2001):

- Solids do not extrude from the upper surface of the sampler.
- Overlying water is present in the sampler (indicating minimal leakage).
- Overlying water is clear and not excessively turbid.
- Desired depth of penetration has been achieved.
- The solids-water interface is intact and relatively flat, with no sign of channeling or sample washout.
- There is no evidence of sample loss.

The following procedure defines steps to be taken when sampling moist, wet, or submerged solids with a dredge sampler:

1. Collect the necessary equipment. Clean and decontaminate the equipment, using procedures appropriate for the analytical parameters to be measured.
2. Arrange the appropriate sampling containers.
3. Don a new pair of nitrile or latex gloves.
4. Using a thoroughly cleaned and decontaminated dredge-type sampler and working on a clean, decontaminated surface, arrange the sampler in the open position, setting the trip bar so that the sampler remains open when lifted from the top.
5. Slowly lower the sampler to a point just above the solids surface.
6. Drop the sampler sharply into the solids, then pull sharply on the line, thus releasing the trip bar and closing the dredge.
7. Raise the sampler and place on a clean surface. Slowly decant or siphon any free liquid through the top of the sampler. Take care to ensure that fines are not lost in the process; if necessary, allow the sampler to sit and the fine particles to settle before decanting or siphoning free liquid.

8. Open the dredge and transfer the solids into a large stainless steel bowl or tray of sufficient size to receive three sample loads.
9. Repeat steps 4 through 8 in diagonal corners (or, if round, two opposite compass points) and the center of the catch basin. Material recovered at each point should be representative of the total depth of solids in the sampling device. If necessary, modify sampling points to correspond to catch basin size or dimensions. Record any deviations in the field notes.
10. Mix to homogenize thoroughly, using a decontaminated or disposable stainless steel spoon.
11. Collect a suitable portion of the mixed solids with a decontaminated or disposable stainless steel spoon and place into each appropriate sample container.
12. Check that a Teflon® liner is present in caps, if required. Secure the caps tightly. Label sample containers clearly with all appropriate sample information.
13. Place samples in cooler for transport. Refrigeration to 4° Celsius (C) is usually required. Transport time to the laboratory should be as short as possible and must be documented with a chain-of-custody form.
14. Ensure that appropriate field notes, as detailed in the Field Documentation, Section 4.1, have been collected.
15. Complete the chain-of-custody documents.

## 5.0 Sample Acceptability

Only solids that are collected correctly with grab or core sampling devices should be used for subsequent physicochemical testing. Acceptability of grabs can be ascertained by noting that the samplers are closed when retrieved, are relatively full of solids (but not overfilled), and do not appear to have lost surficial fines. Core samples are acceptable if the core was inserted vertically in the solids and an adequate depth was sampled without significant loss out the mouth of the corer.

## 6.0 Quality Assurance and Quality Control

A rinsate sample may be appropriate or required when non-disposable sampling equipment is used. The equipment rinsate should be collected between sampling locations and after the device has been decontaminated. The rinsate sample should be analyzed for the same parameters analyzed for in solids.

## 7.0 Resources

1. ASTM. September 1994. Standard Guide for Collection, Storage, Characterization, and Manipulation of Sediment for Toxicological Testing. American Society for Testing and Materials (E 1391-94). West Conshohocken, Pennsylvania.

2. EPA. 1987. A Compendium of Superfund Field Operations Methods, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response (EPA/540/P-87/001), Washington, D.C.
3. EPA. 2001. Methods for Collection, Storage, and Manipulation of Sediment for Chemical and Toxicological Analyses: Technical Manual. U.S. Environmental Protection Agency, Office of Water (EPA-823-B-01-002). Washington, D.C. October 2001.

*Appendix E*  
*Stormwater Sampling Standard*  
*Operating Procedure*

## ***APPENDIX E - GRAB STORMWATER SAMPLE COLLECTION STANDARD OPERATING PROCEDURES***

The purpose of this document is to provide standard operating procedures (SOPs) to be followed during collection of stormwater grab samples at the Univar facility located at 3950 NW Yeon Avenue in Portland, Oregon (the site). These SOPs will provide the information and procedures necessary to collect samples that provide accurate and meaningful information about the characteristics of the stormwater runoff at the site.

### ***PREPARATION***

Because stormwater sampling may need to be conducted with little warning, the sampler should be prepared with equipment, rain gear, and sample bottles stored and ready for sampling. Accutest Laboratories, the analytical laboratory that will analyze the samples collected at the site, should be contacted in advance to provide the required sampling containers and coolers. The equipment required for sampling should be gathered and stored in a field kit, and should include:

- Rain gear (jacket, pants/overalls, boots, etc.);
- Disposable, powder-free, phthalate-free gloves;
- Pole and strapping tape (if required for difficult to reach sample locations);
- Coolers with ice for sample preservation;
- Sample containers from the laboratory;
- Deionized (DI) water for rinsing reusable container; and
- Field notebook for recordkeeping.

## **SAMPLE COLLECTION**

A manual grab sample is collected by inserting a container under or down-current of a discharge flow with the container facing **upstream**.

The sampler should follow the steps below:

1. Pre-label as much information as possible on the sample containers provided by the laboratory. Wear disposable, powder-free gloves when handling and filling sample containers.
2. Collect the grab samples from the horizontal and vertical center of the stormwater flow with the sample container facing **upstream**. The samples should be collected directly in the containers provided by the laboratory. Make sure that the mouths and the inside of the sample containers are not touched and the lids of the containers are not set directly on the ground (hold in free hand or set on plastic sheeting).
  - If sample bottles contain preservatives from laboratory, special care should be taken to avoid spills, splatters, or loss of the preservative when collecting the stormwater sample.
  - If access to the stormwater flow is difficult and the bottles need to be taped to a pole, the individual sample bottles should be taped to the pole **one at a time** to collect samples.
  - If sediments are present in the outfall, avoid stirring up the sediments and capturing in sample containers.
3. Replace lid on sample container, complete labeling as required, put in protective packaging (i.e. bubble wrap, plastic bags), and place in coolers with ice to preserve until samples are collected by or dropped off at the laboratory.
4. Fill out chain-of-custody completely and place in cooler with laboratory samples.
5. Coordinate with Accutest Laboratories for drop-off or pick-up of samples ensuring that all holding times for specific analyses will be met.

## ***RECORDKEEPING***

Detailed records of sampling activities conducted during stormwater sampling should be kept in a field notebook. The information included in the sampling records should include:

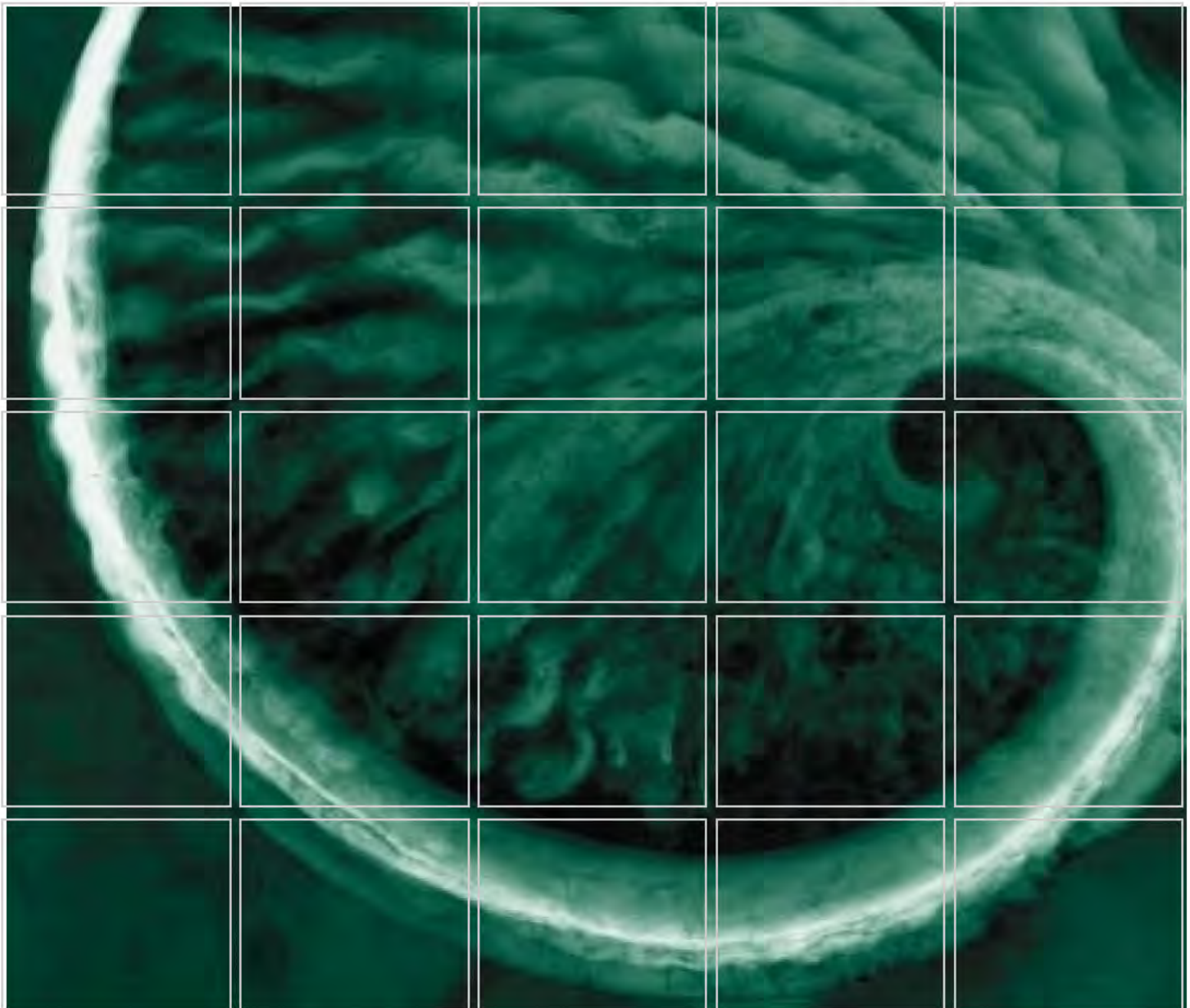
- Date and time of sampling
- Weather conditions
- Name of sampler
- Sample location
- Collection method (i.e. by hand, with pole)
- Sample containers filled (number, size, method)
- Any unusual circumstances encountered during sampling

## ***REFERENCES***

US Environmental Protection Agency (EPA), *NPDES Storm Water Sampling Guidance Document*. EPA-833-B-92-001. July 1992.

Washington State Department of Ecology, *How to do Stormwater Sampling*. Publication #02-10-071. December 2002 (rev. 1/05)

*Appendix F*  
*QAPP (Electronic Version Only)*



## Quality Assurance Project Plan

3950 NW Yeon Avenue  
Portland, Oregon

December 2015

**Prepared for:**  
Univar USA Inc.

[www.erm.com](http://www.erm.com)

Univar USA Inc.

## Quality Assurance Project Plan

Univar USA Inc.  
3950 NW Yeon Avenue  
Portland, Oregon

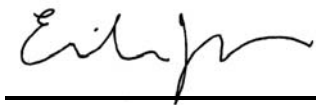
December 2015

Project No. 0274640



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**1.0**

***DISTRIBUTION LIST***

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Univar Director, Remediation: Jack Spicuzza

ERM Project Manager: Brendan Robinson

ERM Project QA Coordinator: TBA

Accutest Laboratories Project Manager: Elvin Kumar

## 2.0 *PROJECT MANAGEMENT*

### 2.1 *INTRODUCTION AND PROJECT ORGANIZATION*

This Quality Assurance Project Plan (QAPP) presents the quality assurance (QA) and quality control (QC) objectives, organization, and functional activities associated with the sampling and analyses of storm water and catch basin solids samples obtained during the storm water source control evaluation to characterize storm water discharges at the site. This work is being conducted on behalf of Univar USA Inc. (Univar) at the Univar facility located at 3950 NW Yeon Avenue in Portland, Oregon (the site) in accordance with the *Stormwater Source Control Evaluation Work Plan* (the work plan). This QAPP is prepared in general accordance with the United States Environmental Protection Agency (EPA) guidance for the preparation of QAPPs (USEPA 2002).

The purpose and objectives of the storm water sampling are described in the work plan.

As part of this project, Environmental Resources Management (ERM) will assist with the data analysis and reporting under contract with Univar. Under contract with Univar, Accutest Laboratories (Accutest), will be performing the analyses for water and sediment.

Contact information for key personnel for the storm water source control evaluation (SCE) project is provided in Table 1.

#### 2.1.1 *Tasks Description*

The tasks to be completed for this project include field sampling, laboratory analysis, data quality evaluation, data management, data analysis, and reporting.

The tasks to be completed in the field are detailed in the work plan, which includes procedures for:

- Field activity documentation;
- Sampling equipment;
- Sample collection and handling;

- Sample identification and chain-of-custody; and
- Equipment decontamination.

Summaries of samples and analyses for storm water and sediment, analyses to be performed by the laboratory, and the analytical methods that will be used are presented in the work plan, including the JSCS screening level values (SLVs) for each analyte. Sample locations and rationale are provided in the work plan. The laboratories will report the results in hardcopy and as an electronic data deliverable in a format suitable for importing into the site database. ERM will perform the data validation and data quality assessment.

### 2.1.2 *Data Quality Objectives*

The purpose of this QAPP is to describe the requirements and/or criteria necessary to produce data of sufficient technical quality to assist in characterizing the storm water across the site. This is achieved through the assessment of data quality measures, including precision, accuracy (bias), representativeness, completeness, comparability, and data reporting limits against the quality control criteria.

Data Quality Objectives (DQOs) are qualitative and/or quantitative statements to ensure that data of known and appropriate quality are collected to support specific decisions or answer specific regulatory requirements. The DQOs describe what data are needed, why the data are needed, and how the data will be used to address the problem being investigated. DQOs also establish numeric limits for the data to allow the data user (or reviewers) to determine whether data collected are of sufficient quality for their intended use.

The project DQO for this Storm Water Source Control Evaluation is to:

- Characterize the storm water collected from various locations across the site to determine if the storm water system is a source of contamination to the Portland Harbor. The characterization will be used as a basis for planning interim remedial measures (IRMs) or storm system improvements (if needed).

### 2.1.3 *Data Quality Control*

Data generated during the project will provide the basis for decisions on potential sources of contamination to storm water system, and suitable

mitigation methods (if necessary). In order to support this use, and to fulfill project objectives, useable data are required.

The usability of the data collected during this project depends on its quality established through a quality control (QC) review. Multiple factors relate to the quality of data, including sample collection methods and analytical methods. Following standard operating procedures (SOPs) for both sample collection and analysis will reduce sampling and analytical error. Complete chain-of-custody documentation, adherence to required sample preservation techniques, holding times and proper shipment methods ensure sample integrity.

Quantification limit objectives are based on the extent to which the laboratory equipment, field equipment, or analytical process, can provide accurate data measurements of reliable quality for specific constituents in field samples. The actual quantification limit for a given analysis will vary depending on instrument sensitivity and matrix effects.

#### **2.1.4**      *Data Quality Indicators and Method Quality Objectives*

The data quality indicators (DQIs) presented in this section are: precision, accuracy, representativeness, comparability, completeness, sensitivity (PARCCS), and the additional indicator of selectivity. PARCCS can be applied to both field and laboratory analytical measurements to ensure that data of known and appropriate quality are obtained to support specific decisions or regulatory actions. Selectivity is a data quality indicator that applies specifically to laboratory data to ensure that reported data are representative of the reported compound and not of a positive or negative artifact.

Method quality objectives (MQOs) are project-specific requirements for the DQIs. The MQOs are selected to support any statistical requirements of the analytical data. Because this project involves a preliminary survey, and follow-up will be required if contamination is identified, it has been determined that standard laboratory acceptance limits will be sufficient to meet project objectives to characterize water and sediment for constituents of interest. A discussion of the DQIs follows below:

**Precision.** Precision is defined as the degree of agreement between or among independent, similar, or repeated measures. Precision is expressed in terms of analytical variability and will be calculated intra-laboratory. For this project, analytical variability will be measured as the relative percent difference (RPD) or coefficient of variation between analytical

replicates/duplicates (i.e., field or laboratory) and between the matrix spike (MS) and matrix spike duplicate (MSD) analytical results. Short-term precision will be measured since the duplicates will be analyzed at the same time the primary samples are analyzed.

Where:

$$\% RPD_i = \left( \frac{|O_i - D_i|}{\frac{(O_i + D_i)}{2}} \right) * 100$$

%RPDi = Relative percent difference for compound i

O<sub>i</sub> = Value of compound i in original sample or MS

D<sub>i</sub> = Value of compound i in duplicate sample or MSD

The resultant RPD will be compared to acceptance criteria and deviations from specified limits reported. If the acceptance criteria are not met, the laboratory or laboratories will supply a justification of why the acceptability limits were exceeded and implement the appropriate corrective actions.

**Accuracy.** Accuracy is the amount of agreement between a measured value and the true value. It will be measured as the percent recovery (%R) of the matrix spike/matrix spike duplicate (MS/MSD), laboratory control samples, and surrogate spike compounds. It also will be measured using the analytical results of instrument calibration and other laboratory internal standards.

Accuracy will be calculated as the %R of analytes as follows:

Where:

%R<sub>i</sub> = percent recovery for compound i

Y<sub>i</sub> = measured analyte concentration in sample i  
(measured - original sample concentration)

X<sub>i</sub> = known analyte concentration in sample i

The resultant percent recoveries will be compared to acceptance criteria and deviations from specified limits will be reported. If the objective criteria are not met, the laboratory or laboratories will supply a justification of why the acceptability limits were exceeded and implement the appropriate corrective actions.

**Representativeness.** Representativeness is the degree to which data accurately and precisely represent a parameter variation at a sampling point or an environmental condition. During the SCE, the results of all analyses will be used to evaluate the data to determine if the samples were collected in a manner such that the results appropriately describe the area investigated.

**Comparability.** Comparability is the degree to which data from one study can be compared with data from other similar studies, reference values (such as background), reference materials, and screening values. This goal will be achieved by: 1) using standard techniques to collect and analyze representative samples and by reporting analytical results in appropriate units; and 2) comparing past and future results.

**Completeness.** Measurement of completeness (C) can be defined as the ratio of acceptable (non-rejected) measurements obtained to the total number of measurements for an activity. Completeness can be defined as:

$$C = \frac{\text{(Number of acceptable data points)}}{\text{(Total number of data points)}} \times 100$$

**Sensitivity.** As used in this context, sensitivity refers to the ability of project analytical procedures to identify and quantify target analytes at concentrations low enough to meet project data needs. Specific indicators of sensitivity in analytical measurements include the method detection limit (MDL), method reporting limit (MRL), and the sample-reporting limit (SRL).

The MDL is a purely statistical value, which is defined by EPA as the concentration at which an analytical system has a 99 percent probability of avoiding false positive results, and is determined by preparation and analysis of a minimum of seven replicate portions of a low level standard. The MDL lies in a region of high quantitative uncertainty, and results near the MDL must be considered as estimates.

The MRL is normally set at a factor of 5 to 10 times the MDL. The exact number depends on the lowest concentration that a laboratory can successfully use as a low calibration standard. The MRL is considered the lowest concentration that a lab can report with reasonable quantitative accuracy, although results less than 5 times the MRL can still be highly variable.

The SRL represents the lowest concentration of an analyte that can be reported with reasonable quantitative accuracy in a particular sample. The SRL is typically represented as the MRL multiplied by a dilution factor.

The sensitivity of the analytical methods (i.e., method reporting limits) identified for this project are sufficient to allow comparison of project results to decision criteria from the DEQ risk-based concentrations (RBC) tables. Analytical MRLs for all requested analytes are listed in the work plan.

**Selectivity.** Selectivity is the ability of an analytical procedure to accurately identify an analyte, and to distinguish that analyte from interferences. In order to ensure that project data needs are met, any subcontract laboratories will follow method requirements, including second column or GC/MSD confirmation for organic compounds, and will discuss compound identification issues with ERM if they are identified.

## **2.1.5**      *Documents and Records*

Records will be maintained, document the activities and data related to the field sampling, laboratory analysis, and the results of the data verification and validation. These records will be archived in the project file. The sampling results will also be stored in the project database, maintained by ERM.

All documents pertaining to this project will be filed in the ERM office or archive. Project files will include correspondence, final reports, field notes, laboratory results, etc. The files will be maintained by ERM for at least 10 years.

### **2.1.5.1**      *Field Documentation*

Field logbooks will be the main source of field documentation for all field activities. Notes will be taken in indelible, blue or black ink. The front and

inside of each field logbook will be marked with the project name, number, and logbook number. The field logbooks or copies of the field notes will be stored in the project files when not in use and upon completion of each sampling event.

The first entry at the beginning of each day will state the date and time, project number, names of all field personnel on site (including subcontractors and the company for which they work), weather conditions, and the purpose of fieldwork. Each subsequent page will be started with the project number and the date. The bottom of each page will have the date and the initials of all personnel entering information onto that page. Any remaining unused lines will be crossed through. Errors will not be erased. All errors will have a single strikethrough with an initial and date next to the strikethrough and the subsequent change made. At the end of each day the field staff will sign the field logbook.

Information specific to each storm water sampling location will be recorded during sampling in the log book. Information recorded on the FSDS may include, but will not be limited to:

- Sampling location identification;
- Weather conditions;
- Surrounding site activities;
- Date and time of sampling for each field sample and QA/QC sample;
- Sample identification or naming system, including each unique sample name/number;
- Volume of sample collected by number and type of sample containers;
- Sample preservation techniques and analyses requested; and
- Information relevant to quality control (e.g., sampling discrepancies or difficulties, unexpected conditions, abnormal sampling procedures).

Once the sample has been collected, the sample will entered onto the chain of custody (COC) forms. These forms are used to document the custody of the samples from the field until receipt at the laboratory. Upon receipt at the laboratory the samples will be checked for physical integrity and logged into the laboratory sample tracking system. The COC forms and the sample receipt forms will be included in the laboratory data report package. Any discrepancies in the physical conditions of the samples or breaks in the chain of custody will be reported within 24 hours of sample receipt.

#### 2.1.5.2 *Laboratory Documentation*

It is not anticipated that full validation of raw data will be required for samples collected in support of this project. Laboratory documentation and data deliverables will therefore not include raw data, but will include sufficient detail to assess data quality. Specific documentation to be included in the laboratory data packages includes:

- A case narrative that describes any problems encountered by the lab during analysis of project samples and results limitations in data usability;
- A cross-reference between laboratory sample IDs and project sample names;
- Summaries of analytical results for project samples, including method detection limits, method reporting limits or sample quantification limits, preparation and analytical method used, identification of any dilution performed, and footnotes to indicate any data usability limitations;
- Summaries of quality control results associated with the project samples including laboratory blank results, blank and matrix spike recoveries, duplicate analysis results, and surrogate recoveries where applicable; and
- Copies of the COC forms and laboratory sample receipt forms.

#### 2.1.5.3 *Quality Documentation*

Data verification and validation will be performed by ERM. Data validation will include reviewing the laboratory documentation, results of quality control samples, assessment of data completeness, comparison to the data quality objectives, and an assessment of the overall quality of the data, including qualifiers and limitations on the use of the data. A data validation report will be prepared by ERM and included in the final report.

### **3.0 DATA ACQUISITION**

The work plan describes the rationale and approach that will be used to evaluate storm water as a source of contamination to the Portland Harbor. Storm water and sediment samples will be collected to determine if the storm sewer system is a pathway of contaminants of interest (COIs) by comparing the results to the Joint Source Control Screening (JSCS) criteria. The results of this assessment will be used to determine appropriate Best Management Practices (BMPs), future monitoring requirements, and IRMs, as required.

### **3.1 SAMPLING PROCESS DESIGN**

A combination of storm water grab and sediment samples will be collected from locations across the site. The objective is to collect samples from locations that are representative of the storm water entering the storm sewer system from the various activities across the site. The storm water and sediment samples from each location will be analyzed for the chemical constituents listed in the work plan.

#### **3.1.1 Sampling Methods and Handling**

The methods used to collect storm water and sediment samples are detailed in the work plan. The equipment and techniques used depend on the physical conditions of each location and the type of sampling specified. Standard operating procedures (SOPs) are given in the appendices of the work plan.

All the containers will have screw type lids, with Teflon® inserts to prevent a reaction with the plastic sample lid. If required, preservatives will be added to the jars at the laboratory.

The sample jars used will be commercially available, pre-cleaned jars. The laboratory will maintain shipping and certification records from the supplier to trace the bottles back to the respective bottle rinse blank results. The bottle documentation supplied by the laboratory will be included in the ERM project file.

The laboratory will not dispose of the samples until authorized by Univar. The laboratory will appropriately dispose of the samples based on the matrix and analytical results. If the samples are determined to be hazardous, the remaining material will be disposed of through the appropriate laboratory waste handling procedures.

### 3.2 *ANALYTICAL METHOD REQUIREMENTS*

Analytical methods used will be appropriate for the intended use of the data as described in this QAPP. Analytical methods will include EPA-approved methods specified in SW-846 that comply with MRLs specified in the Portland Harbor Joint Source Control Strategy (DEQ and EPA 2005). Adherence to the relevant preparation and extraction, analytical and reporting methods will be evaluated during the data review. The analytical methods for individual analytes are summarized in the work plan.

### 3.3 *QUALITY CONTROL*

Quality control (QC) samples will be prepared in the field and in the laboratory to assess the bias and precision of the field and laboratory methods.

#### 3.3.1 *Field Quality Control*

Field QC samples will be collected at a frequency of one set of QC samples per field event. Field QC samples will consist of field duplicates, MS/MSD, and equipment rinsate blanks.

Field duplicates are replicate samples collected at the same location during the same sampling session and at the same time. Due to sample volume requirements, field duplicates will be collected at a grab sample or sediment sample location. Field duplicate samples are submitted to the contract laboratory. Field duplicates provide an indication of the reproducibility of the sampling and analysis procedures for a given sample matrix, including heterogeneity of the sample itself. The field duplicates will be collected in the same container types and handled and analyzed in the same manner as all other samples.

Laboratory QC samples are field samples that are designated for laboratory QC procedures such as matrix spike analysis. Extra volume

must be collected for laboratory QC samples in containers provided by the laboratory, so that the laboratory has sufficient volume to perform all required analyses.

Equipment rinsate blanks are samples designed to assess the potential for cross-contamination after equipment decontamination. These samples are collected from the final de-ionized water rinse, following equipment decontamination. The equipment rinsate blank sample is collected in a full suite of sample containers and the sample is analyzed for the same suite of compounds as the investigative samples.

### **3.3.2      *Laboratory Quality Control***

The detailed requirements for the laboratory QC procedures are given in the EPA method protocols that have been referenced. These requirements also include control limits and corrective actions. The laboratory will adhere to the QC procedures in the method protocols and this QAPP. Laboratory QC samples will include method blanks, matrix spike, matrix spike duplicates, and surrogates. The frequency of laboratory QC samples will be one every twenty samples, with a minimum of one per extraction batch.

The control limits, or method quality objectives, for the applicable recoveries and relative percent differences have been established by the laboratory as required by EPA SW846 methods. These criteria will be used by the laboratory to determine the acceptability of the data.

## **3.4            *EQUIPMENT CALIBRATION PROCEDURES***

All analytical instruments shall be calibrated using traceable standards in accordance with the specified analytical methods and manufacturers' procedures. Calibration procedures, at a minimum, will consist of an initial calibration, assessment of a detection limit standard, analysis of calibration blanks, and, as appropriate, analysis of interference check samples.

Laboratory instruments and measurement equipment will be calibrated in accordance with manufacturer's instructions and the analytical laboratory's quality assurance plans (QAP) presented in Appendix A.

Records of standard preparation and instrument calibration data shall be maintained. Instrument calibration shall include daily checks using

material prepared independently of the calibration standards; instrument response shall be evaluated against established criteria. The analysis logbook, maintained for each analytical instrument, shall include, at a minimum, the date and time of calibration, the initials of the personnel performing the calibrations, the calibrator reference number and concentration the equipment was calibrated against.

### **3.5      *INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES***

The quality of the supplies and consumables used during sample collection and analysis can affect the quality of the data. Equipment should be cleaned so that there is no detectable contamination introduced to the samples or extracts.

The laboratory will provide cleaned and documented sample containers. The containers will be visually inspection prior to use. Any suspect containers will be discarded.

Solvents used in equipment decontamination will have documented purity, and the containers will be initialed and dated when opened. The quality of de-ionized water used for decontamination and equipment blanks will be documented. If the laboratory provides de-ionized water, the laboratory will document the quality. De-ionized water that is not sourced from the laboratory will require a de-ionized water blank sample to be collected.

Reagents and calibration standards of appropriate purity, and suitably cleaned equipment will be used during the laboratory analysis. The acceptance criteria for the laboratory supplies and equipment are detailed in the laboratory SOPs and QAP. The documentation and certifications for field supplies and equipment will be retained by ERM, whereas the documentation and certifications for laboratory supplies and equipment will be retained by the laboratory.

### **3.6      *DATA MANAGEMENT***

Data for this project will be generated in the field and the laboratory, then reviewed for acceptability, and entered in the project database. Data manipulations, such as unit conversions and corrections, will be recorded in the database change log.

### **3.6.1**      *Field Data*

Data generated in the field will include field log book entries, location identifications, sample dates, field parameter measurements, observations, and additional information (such as field duplicate number). These data will be manually entered into an electronic format, then checked by a second person, before final inclusion in the database.

### **3.6.2**      *Laboratory Data*

Data generated by the subcontract laboratories will undergo data reduction and review procedures described in the laboratory QAP and SOPs. Data generated, reduced, and reviewed by the laboratories will undergo a comprehensive data review under the direction of the laboratory QA Officer or designee.

Laboratory analytical data are first generated in raw form at the instrument. These data may be in either graphic form or printed tabular form. Specific data reduction, generation procedures, and calculations are found in each of the methods, as well as within the laboratory QAP and SOPs.

#### **3.6.2.1**      *Laboratory Data Reduction*

The laboratory will perform in-house analytical data reduction under the direction of the laboratory QA Officer or designee. Laboratory reduction procedures will be those adopted, where appropriate, from SW-846 (EPA 1986) and those described in the laboratory QAP. The data reduction steps will be documented, signed, and dated by the analyst or designee. Data reduction will be conducted as follows:

- Raw data produced by the analyst will be processed and reviewed for attainment of QC criteria as outlined in this document and/or established EPA methods for overall reasonableness and for calculation or transcription errors.
- Data will then be entered into the Laboratory Information Management System (LIMS) and a computerized report will be generated and sent to the laboratory QA Officer or designee for review.
- Laboratory qualifiers as described and defined in the laboratory QAPs will include, but are not limited to:
  - Concentrations below required reporting limits.

- Estimated concentrations due to poor spike recovery.
- Concentrations of the chemical also found in the laboratory blank.
- Other sample-specific qualifiers necessary to describe QC conditions.

The laboratory will maintain detailed procedures for laboratory record-keeping to support the validity of all analytical work. Each data report package submitted to Univar will contain the laboratory's written certification that the requested analytical method was run and that all QA/QC checks were performed. The laboratory program administrator will provide QC reports of their external audits, if appropriate, which will become part of the project files.

Data obtained from laboratory analysis are reduced in accordance with procedures outlined in the laboratory QAP. Unless otherwise specified, all data will be calculated and reported in units consistent with other organizations reporting similar type data to allow comparability of databases among organizations. Data will be reported in milligrams per liter (mg/L) or micrograms per liter (µg/L) for water and milligrams per kilogram (mg/kg) or micrograms/kilogram (µg/kg) for sediment.

#### 3.6.2.2 *Laboratory Data Review*

This review process involves evaluation of both the results of the QC data and the professional judgment of the person(s) conducting the review. This application of technical knowledge and experience to the evaluation of data is essential in ensuring that high quality data are generated. Each subcontract laboratory has documented procedures, which are to be followed and must be accessible to all laboratory personnel.

The laboratory QA Officer or designee will evaluate the quality of the work based on this document and an established set of laboratory guidelines to ensure the following:

- Sample preparation information is correct and complete;
- Analysis information is correct and complete;
- Appropriate procedures have been followed;
- Analytical results are correct and complete;
- Laboratory QC check results are within appropriate QC limits;

- Special sample preparation and analytical requirements have been met;
- Documentation is complete (all anomalies in the preparation and analysis have been documented; holding times are documented); and
- Laboratory qualifiers have been assigned to all samples with data usability limitations.

### 3.6.2.3 *Laboratory Data Deliverables*

Upon acceptance of the data by the laboratory QA Officer, or designee, deliverables will be generated and submitted to the ERM project manager. Each data report package submitted will contain the laboratory's written certification that the requested analytical method was run and that all laboratory QC checks were performed. The laboratory program administrator will provide the QC reports of their external audits, if appropriate, which will become part of the project files.

Along with a hardcopy of the results, the laboratory data (including QC sample results) will also be reported as an electronic data deliverable (EDD) suitable for import to the project database.

ERM will be fundamentally responsible for the monitoring of field and sampling activities in order to maintain an appropriate level of sample QA. This project has a limited scope and only involves a small number of project team members. The ERM project and task managers will stay in close verbal communication with the field sampling team and the laboratory. Due to the size of this project, few scheduled assessment activities are planned.

## 4.1.1

*Assessments and Response Actions*

The planned assessment activities the project team will perform include readiness reviews prior to sampling and prior to the release of final results to data users. Internal reviews will be on-going throughout the implementation of the project. No reports will be generated from the readiness reviews. Corrections to the database, based on reviews, will be tracked through the database change log.

Pre-sampling preparation includes organizational and procedural planning before the actual sampling takes place. Each team member will understand their specific role and the roles of the other team members so that the sampling event reflects a coordinated effort. Each team member will understand the proper equipment and procedures to be used, the schedule of sampling events, the sequence of activities during any given event, and the health and safety procedures for the project. The project manager will verify that all field equipment is ready to be used at the site, that appropriate subcontractors have been contracted, scheduled and briefed (including a project specific health and safety briefing). Any deficiencies noted during this review will be corrected prior to commencing field work.

A second readiness review will be conducted prior to the release of final data to the users. The data manager will verify that all analytical data have been received from the laboratory, that data validation and quality assessment have been completed, and appropriate data qualifiers have been entered into the database. Deficiencies found during this review will be corrected by the data manager or QA manager. Data users will be notified when the data are ready for distribution.

Review of work products will be conducted through this project to ensure that all phases of work follow the QA procedures in this QAPP. Issues that arise during the project can usually be resolved between the reviewer and the person generating the work product. Any problems that cannot be easily resolved will be brought to the attention of ERM Project Manager. The DEQ will be notified of any problems that may affect the final outcome of the project.

It is the responsibility of every team member to report non-conformances to the ERM project manager, the laboratory QA manager, or the laboratory project manager as applicable. The project manager will ensure that the non-conforming data are not used until the non-conformance is corrected.

If serious problems are encountered during the sampling and analysis, a technical system audit may be required. The audit would be conducted by the ERM QA manager or the laboratory QA manager. The audits may examine any phase of the field sampling, laboratory, or data management activities related to the project. The results of audits will be included in the laboratory data summary report.

#### **4.1.2      *Reports to Management***

Deviations from methods or QA requirements described in this QAPP and the related work plan will be corrected immediately if possible. The ERM project manager will be notified, and assist in the resolving the issue if needed. It is not anticipated that a formal corrective action plan will be required. However, non-conformances that affect the quality of the data, or result in a change in scope, will be noted in the field log book. This documentation will serve as the Corrective Action Report. The data summary report will include a description of the non-conforming issue, any attempted resolutions, and any effect on the quality and usability of the data.

Non-conformances discovered in the laboratory will be reported and resolved through the procedures detailed in the laboratory QAP and the appropriate method protocols. Laboratory non-conformances and the effects on data quality will be described in the data summary report.

## 5.0

### *DATA VALIDATION AND USABILITY*

The field and laboratory data will be verified and validated according to the procedures and criteria described in this section. Data review and assessment for this project will follow guidance from EPA and will be conducted under the supervision of the ERM QA manager or other qualified chemist. The quality and usability of the data will be evaluated and discussed in the data summary report.

## 5.1

### *DATA REVIEW, VERIFICATION, AND VALIDATION REQUIREMENTS*

The field and laboratory data generated during this project will be verified and validated using the data quality review (DQR) process. Errors that are found during verification of the field data, laboratory data, and database entries will be corrected prior to the distribution of the final data.

The DQR will consist of evaluation of the DQIs discussed above against the project specific goals. Basic principles for the DQR will follow the current USEPA functional guidelines for data review, modified to account for use of SW-846 methods and project DQOs. The ERM QA Manager will perform the DQR, and results of the DQR will be routed to the ERM Project Manager for evaluation and action.

The ERM QA Manager will review data reports and field data before data are used in an application or incorporated into a technical report. All analytical data will be reviewed by the laboratory to ensure that data are technically valid, defensible, and in general compliance with DQOs. Sample matrix effects will be evaluated and data will be appropriately identified, qualified, or disregarded. Qualified data, as identified by the laboratory or Project Manager will be so noted on the database and these data, as appropriate, may be excluded from certain project applications.

All tabular and graphical data representations will be reviewed to ensure that information is accurately portrayed. The ERM Project Manager will review all deliverable work products in order to ensure that all findings and conclusions are based upon correct and accurate data. All reports will be prepared to ensure compliance with stipulated regulatory requirements and agency expectations. In situations that require review and evaluation of historic data, the limitations of reliance and the objectives of incorporation in the presentation will be clearly stated.

## 5.2

### ***VERIFICATION AND VALIDATION METHODS***

Field data will be verified during sample preparation and COC documentation, as well as at the completion of the field effort. The field data entries in the database will also be verified, and any errors corrected.

The procedures for verifying and validating laboratory data are detailed in the EPA functional guidelines and summarized in previous sections.

If a significant problem that affects data usability is discovered, the QA manager and project manager will contact the lab to initiate corrective action. If necessary, review of raw data associated with the identified problem will be performed. This further review will focus only on the identified problem, and will not include any analyses that did not exhibit serious deficiencies for an important target analyte.

Explanations of results outside of control limits and corrective actions taken by the laboratory will be described in the case narrative. The laboratory performs a data completeness check and verification as part of the preparation of the EDD. Data entries (including qualifier entries) in the database will be verified against hardcopies. Any errors will be corrected before final release of the data.

## 5.3

### ***RECONCILIATION WITH USER REQUIREMENTS***

The purpose of data validation is to determine the quality of the data gathered for each point. Data is evaluated against performance-based control limits. Non-conforming data may be either qualified or rejected. Rejected data will not be used.

As described in the EPA functional guidelines for data review non-conforming data may be qualified. The data qualifiers used for this project will be taken from the EPA function guidelines for data review, and will include:

U - The analyte was not detected above the method detection limit or quantitation limit.

J - The analyte was positively identified, but the associated concentration is an estimate.

UJ - The analyte was not detected above the stated quantitation limit, but the quantitation limit is an estimate, and may or may not represent the actual limit of quantitation needed to accurately measure the analyte in the sample.

N - Presumptive evidence of analyte presence was detected, but not all identification criteria were met. The presence of the analyte and the associated numerical concentration are both uncertain.

R - Results for the analyte are unusable due to serious deficiencies in the sample analysis. The presence or absence of the analyte cannot be verified.

Limitations on data use that are found during validation will be discussed in the data summary report. Data users will be informed on the limitations of the data and the potential effect on data interpretation and analysis.

DEQ and USEPA. 2005. Portland Harbor Joint Source Control Strategy, Final, December 2005. Revision, July 2007. Oregon Department of Environmental Quality and U.S. Environmental Protection Agency, Portland, Oregon.

USEPA. 2002a. EPA Guidance for Quality Assurance Project Plans (EPA QA/G-5 EPA, EPA/240/R-02/009). U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C.

USEPA, 1999. USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. (EPA-540/R-99-008). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

USEPA, 2002c. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. (EPA-540/R-99-008). U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

*Table*

*Table 1*  
**Project Team Contact Information**  
 Univar USA Inc.  
 QAPP

Company	Name	Project Role	Phone	Email
		ODEQ Portland Harbor		
ODEQ	L. Alexandra Liverman	Stormwater Coordinator	(503) 229-5354	<a href="mailto:liverman.alex@deg.state.or.us">liverman.alex@deg.state.or.us</a>
Univar	Jack Spicuzza	Director, Remediation	(614) 376 0960	<a href="mailto:jack.spicuzza@univarus.com">jack.spicuzza@univarus.com</a>
ERM	Erik Ipsen	Partner	(503) 488-5282	<a href="mailto:erik.ipsen@erm.com">erik.ipsen@erm.com</a>
ERM	Brendan Robinson	Project Manager	(503) 488-5282	<a href="mailto:brendan.robinson@erm.com">brendan.robinson@erm.com</a>
ERM	TBA	Project QA Coordinator		
Test America Laboratories	Sarah Murphy	Project Manager	(253) 922-2310	<a href="mailto:sarah.murphy@testamericainc.com">sarah.murphy@testamericainc.com</a>

Notes:

ODEQ - Oregon Department of Environmental Quality

*Appendix A*  
*Accutest Laboratories Quality*  
*Assurance Plan*

# Quality Assurance Manual

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## Title Page:

# Quality Assurance Manual Approval Signatures

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Laboratory Director – Heather Prater

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Date

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Quality Manager – Terri Torres

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Date

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Technical Manager, Project Management – Kris Allen

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Date

---

Technical Manager, Volatiles – Bisrat Tadesse

---

Date

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Technical Manager, Semivolatiles – Colin McKean

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Date

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Technical Manager, Inorganics – Stan Palmquist

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Date

















































































































































































































































































































































*Appendix G*  
*Project Schedule*

Stormwater Source Control Evaluation Schedule  
Univar NW Yeon Site - Portland, Oregon  
DRAFT FOR REVIEW

